THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVI. No. 1941.] LONDON, JULY 24, 1900. 52ND YEAR. PRICE 6d.

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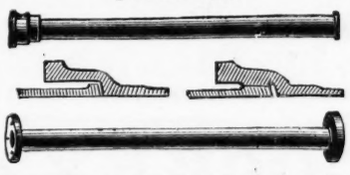

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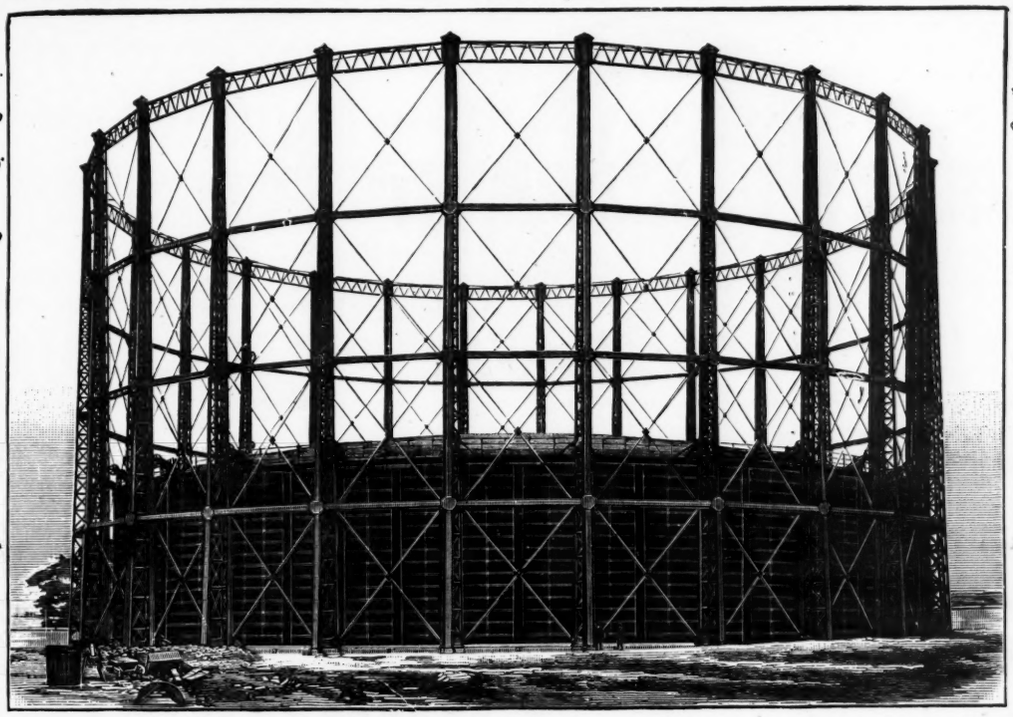

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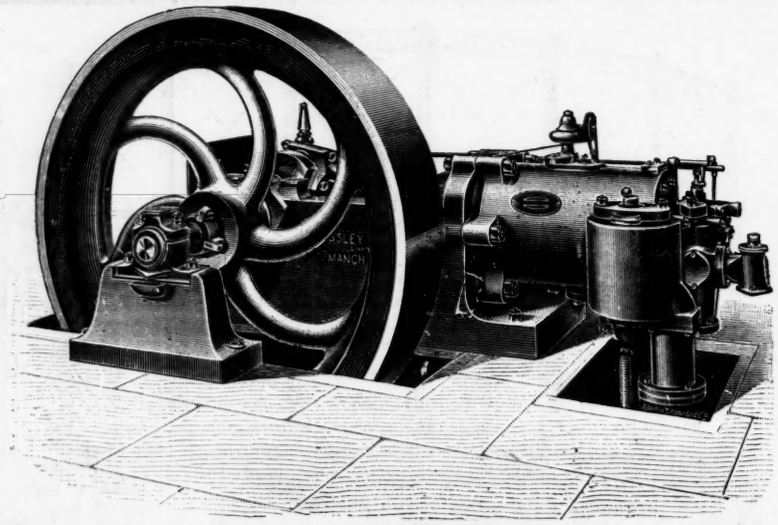

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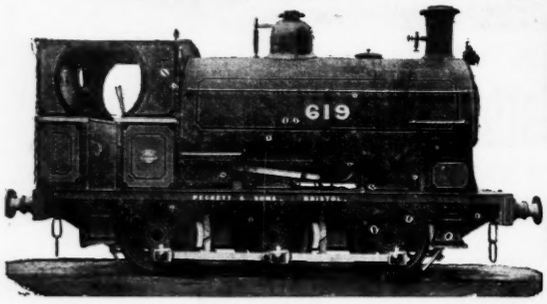

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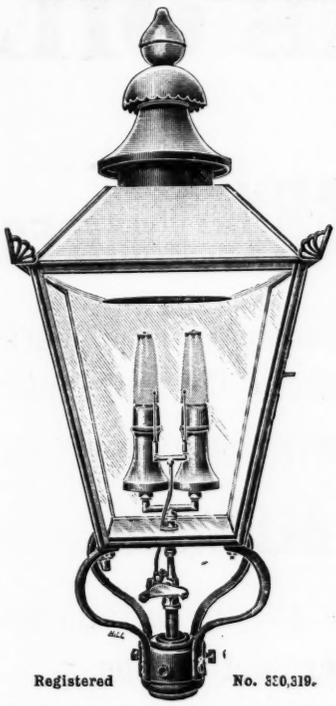

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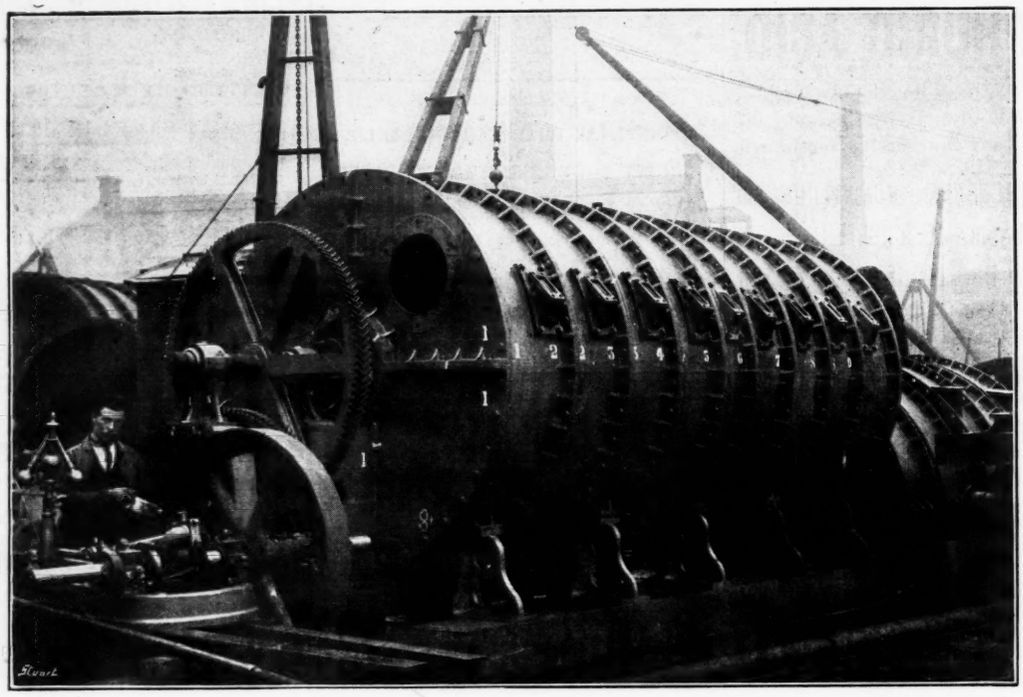

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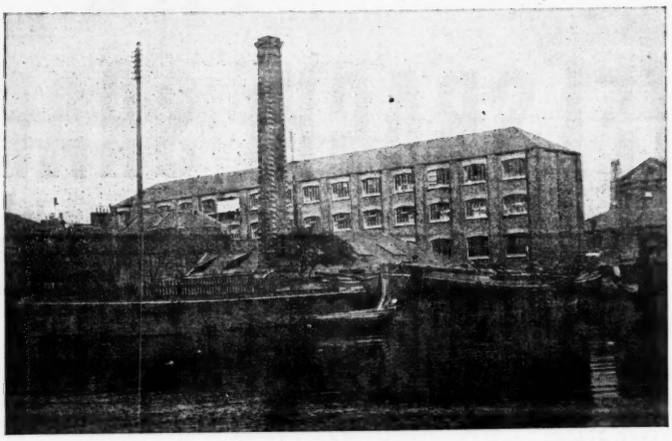

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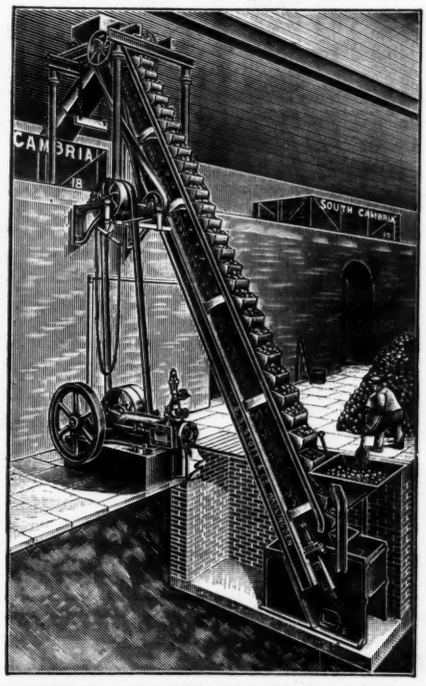

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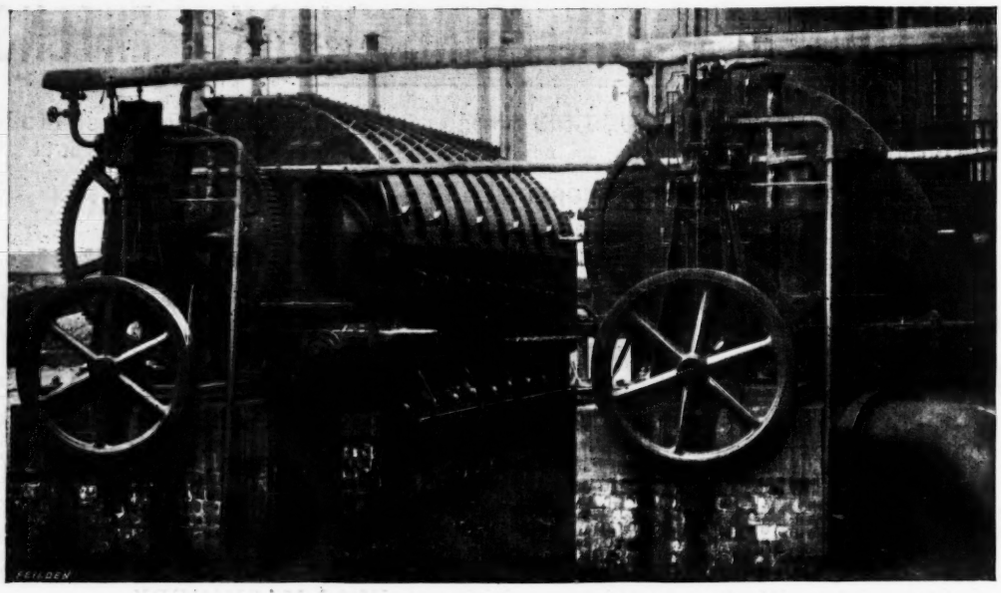

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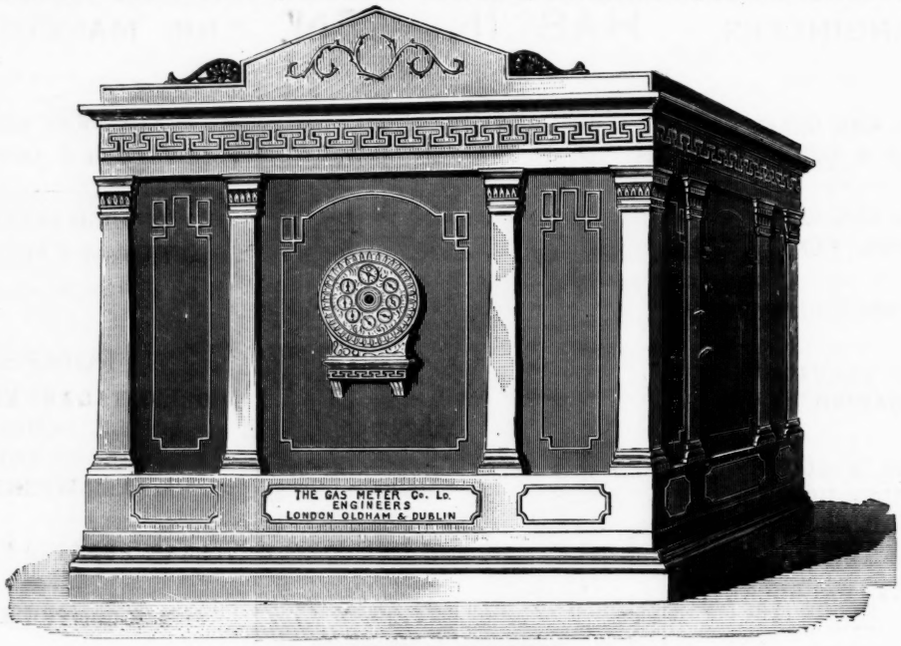

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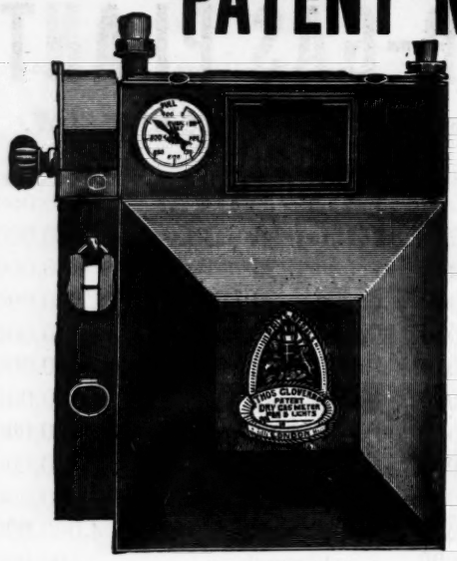

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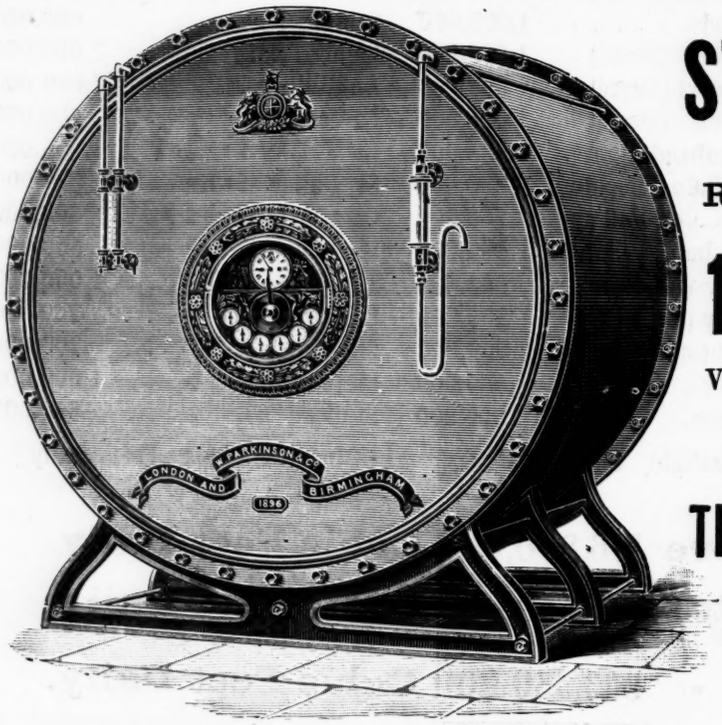

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EDITORIAL NOTES.

The Welsbach-Sunlight Amalgamation.

THE long warfare between the Welsbach and the Sunlight incandescent gas-burner interests is over at last; and, as will be seen by the statement which appears elsewhere, the two Companies will be fused upon terms satisfactory enough to themselves, whatever the public may think of the arrangement. The legal position in this connection is sufficiently remarkable to call for particular notice. It was notified in the paper that Mr. Justice Buckley would deliver judgment in the Kern action the first thing on Wednesday last; but any curious person who might have dropped into Court at about three minutes past the hour for commencing business, would have found the learned Judge going on with another case. What had happened was this: On the Judge taking his seat, Mr. Moulton, Q.C., asked, on behalf of the parties, that his Lordship would consent to formally defer his judgment until the 30th inst. An agreement had been arrived at, and was actually signed, between the parties to the suit that had been heard, as well as to the one which was down for hearing on the 23rd. It awaited confirmation by the shareholders of both Companies, which could not be obtained before the 27th, for which date meetings had been duly called; and if the judgment were postponed until afterwards, his Lordship would be spared the trouble of delivering it. Upon receiving the assurance that the arrangement in question would have the effect of putting an end to all the litigation concerning the patents, Mr. Justice Buckley acceded to Counsel's request; and so the matter ended. The pending action on the 1893 mantle patent has since been taken out of the paper; and the extraordinary result appears that the action on the Kern patent comes to nothing after having occupied the Court during many days, and merely by the parties most immediately interested taking advantage of the accident of judgment being reserved to make terms between themselves.

This may be quite in order; but it looks very much like using the procedure of the High Court to put pressure on one or other party, or both, to enable a private and self-regarding agreement to be brought off. It is well understood that the process of a Criminal Court must not be abused with the object of gaining private ends; and if there could be any civil form of the same kind of abuse, this Kern business is an example of it. Of course, any civil action can be put an end to by the withdrawal of a juror, if it is a jury case, or by consent of the Court. Where the issues are of purely private interest, there may well be as great liberty for stopping a lawsuit as there is for commencing it. But a case under the Patents Act seems to implicate the interest of the public, and to belong to a class of actions which, although necessarily initiated for some private end, must go on to the finish for the sake of their general effect. A litigant who undertakes to demolish another man's patent monopoly for his own private ends, thereby sets free many things to which he may have no more right than anybody else. Nobody asks him to raise the question, which he must do at his own expense; but having set in motion the machinery for carrying out the provisions of a Public Act, is it quite right that the litigant should be open to be "squared," even while the Judge is writing out his decision, and so deprive the public of whatever advantage the community might derive from the labours of the Court?

Obviously, so far as the particular interests of the Welsbach and Sunlight Companies are concerned, it is the best thing these old enemies can do to put their horses together and work the same preserved ground. Whatever may be the intrinsic value of the Kern invention, there can be no doubt that the issues in the action which was pending on the Welsbach mantle patent of 1893 were of cardinal importance. The interest of the gas industry at large and the general public in the question of the validity of this patent is as great as it could possibly be; for the upsetting of the patent would mean the immediate throwing open of the mantle trade to the world, whereas if nobody assails it it will remain in force until 1907. If the united monopolists are wise, they will cut down their patent surcharge to the smallest reasonable ratio of the selling price of their specialities, so as to reduce the temptation to attack the preserve in force. The patent in question, it is to be remembered, is of a description which many publicists regard as unjustifiable. It is apparently a "covering patent," having the effect of prolonging the duration of the prior patent out of which it sprang. In Austria and some other countries, the lifetime

of patents of this description is limited to that of the original patent. Under the existing English law, however, patents remain in force irrespective of the expiry or absence of any foreign patent. It is contended that this condition puts the English public under a disadvantage as compared with the foreigner; and the least a favoured patentee can do is to make his tax as light as possible.

This obligation of moral law and sound commercial sense has not hitherto been acted up to by the Welsbach proprietary. Now that their inveterate rivals, the Sunlight people, have succeeded in forcing the position so jealously kept by the Welsbach interest, the British market is for the moment at the mercy of the Westminster firm. It will not be so for long, however, while fancy prices make the trade so inviting to the adventurous. Now, while they still have all the trade, is the opportunity for the Welsbach Company to make a strong effort to keep it, in the fashion already indicated. If they do not—if their coalition with the Sunlight Company was merely a despairing attempt to save an artificial position by buying off a dangerous foe, just as the degenerate monarchs of decaying states used to purchase temporary safety from their enemies—the lesson of history will doubtless be repeated in their experience. It is unnecessary to repeat that lesson here; and we hope we shall never have to use in this connection the equally familiar phrase—We told you so!

The London Gas Question.

INTEREST in questions of the gas supply of London shifted last week from the parliamentary arena to the cockpit of the London County Council. We were able to publish in last Tuesday's "JOURNAL" the important memorandum on the existing situation of the London Gas Companies, prepared by Mr. H. E. Haward, the able Comptroller of the Council, who once more in this lengthy document displayed that grip of the important facts of the matter which he temporarily lost when he backed up the laboratory gentlemen in their performances before Mr. Oldroyd's Committee. There is nothing to criticize in Mr. Haward's figures; and it is rather to be regretted that he had not the courage of them himself. Take, for example, his admission that the Companies have to pay about 8s. more per ton for their coals, which works out to an enhanced cost for coals of from 8d. to 10d. per 1000 cubic feet of gas. He goes on to observe that residuals appear to bring in 2s. 6d. per ton more, which is about 3d. per 1000 cubic feet. Deducting this from the enhanced cost of coals, we have a net addition of from 5d. to 7d. on the cost of gas manufactured in London. This is roughly the amount of the higher charge decided upon by the Companies. Mr. Haward might have said so, instead of hinting a fault in the query as to whether they (the Companies) "have given "the fullest effect to" the factor of dearer residuals. Of course, if these words were only meant as a caution that Mr. Haward could not speak positively on the course of the residuals market for the coming year, there is no exception to be taken to them; but, in the circumstances, they are open to the suspicion that Mr. Haward, knowing his book, was afraid to justify the action of the Companies overmuch.

The report settles down at the half-length into another impeachment of the administration of the Gaslight and Coke Company. This, of course, was to be expected. The only real "gas question" for London—for all England, even—is this of the Gaslight and Coke Company's past, present, and future. It is impossible to exaggerate the importance of the crisis through which this huge undertaking is now passing; because whatever is done to deal with the emergency must exert an influence over a far wider area than that in which the trouble has originated. The system of gas supply by what is not always rightly styled private "enterprise," the principle of the sliding-scale, the system of administering gas undertakings by boards of directors—all these, and many other elements of the general executive problem, are involved in the actual climax of the affairs of the Horseferry Road. All gas people throughout the length and the breadth of the land are asking anxiously what is to be done. Nobody has the smallest sympathy with the Horseferry Road oligarchy that has brought the great undertaking to this pass. The case is too glaring. If it were only a domestic matter, so that one could leave the Directors to lie uneasily upon the bed they have made for themselves, the affair would wear a different aspect. But the mischief is that they have been bedmakers for others, and that their incapacity afflicts those who would fain have nothing to do with them. The latest excuse offered by the Horseferry Road is the plea of poverty. They have always been "short of capital," as Mr. Field told Lord Brougham's Committee, which is a curious reason for its excessive expenditure during the last fifteen years, as ascertained by Sir James Rankin's Committee. The Company are short of capital now simply because they have come to the end of their once ample tether; but they show no sign of accepting the Prodigal's view of the same situation.

Here is the difficulty. The Governor is flippant, detached, and optimistic; Mr. Field is dogged. Nobody else seems to count. It was they who brought in the Money Bill, and were sent empty away. If they come again next year, and the year after that, in the same way, they will fare the same. That is the prospect before the Company. Parliament will not trust the Directors with another shilling, to misuse as the Powers of Charge Committee said they had squandered their great resources. Unhappily, our forebodings of August last year have been fulfilled to the letter. Mr. Oldroyd's and Lord Brougham's Committees have answered Colonel Makins's strictures on the Powers of Charge Committee. The once well-esteemed policy of Metropolitan gas amalgamation stands hopelessly discredited. If Parliament could dismember the Gaslight and Coke Company next year, and reconstitute the old undertakings as they were, or with a difference, many members would vote for such a measure. Mr. Haward's table, showing the increasing inequality of the prices charged for gas by the two chief representatives of the policy of amalgamation, is a damning count in the renewed indictment of the Horseferry Road system.

Well, what is to be the upshot of it all? The question got "downstairs," in very truth, when it left St. Stephen's for Spring Gardens. The ordinary County Council "Pro-"gressive" is not exactly a Rupert of debate. His oratorical style is strongly reminiscent of that habile controversialist, the 'bus conductor, without the wit. There are exceptions, of course. Mr. Cohen, M.P., is of this honourable category. He wearied of the wild and whirling words which some of his colleagues thought fit to use in what was supposed to be a discussion upon Mr. Haward's report. As he said truly and wisely, the case of the consumers cannot be advanced by the use of violent language in the County Council, and the scattering broadcast of ridiculous aspersions on gas directors. Mr. Cohen understands that the Gaslight and Coke Company are to be pitied as well as blamed. The undertaking needs to be delivered, if the consumers require to be protected. The County Council should set themselves to devise a feasible scheme of reform, nor rest content either with abusing the Gas Companies as if they were pickpockets, or with the pettifogging promptings of those who led the chief London Local Authority into their parliamentary fiascoes of this session. Let the real men of light and leading, like Mr. Cohen, discountenance any recrudescence of the "policy "of pin-pricks," which resulted in the production of the Portable Photometer Bill. Unhappily, the run of members of the Council seem to be incapable of perceiving that Parliament is equally entitled to respect when it rejects a Bill of their promoting as when it deals with a gas company. The recommendation of the Parliamentary Committee, on Mr. Haward's report, was that a conference of Metropolitan Local Authorities should be convened to consider the charges for gas in London. This was very right and reasonable; but the perfervid Progressive mind must needs spoil the reference by adding the subjects of the quality of the gas, as well as the character of the consumers' meters.

Both additions are superfluities. The quality of the gas supplied by the Gaslight and Coke Company has never been questioned; indeed, the Company received so good a testimonial on this account before Mr. Oldroyd's Committee that opinions were freely expressed that the Company's own Bill ought to pass on the strength of it. The manufacture of the South Metropolitan Company's gas has been otherwise settled. There remains only the Commercial district to serve as the hunting-ground of the peripatetic photometrist; but he will find no "game" in those regions. There is no further question as to meters, after this year's legislation. The only real business for the proposed conference is the hard case of the Chartered, and what alternative suggestion the local authorities should

offer to Parliament when the Company next appeal for more capital. It will not have been overlooked by the astute Mr. Haward that he under-estimated the amount of the Company's balance for the past half year. The announcement has been made that the revenue at the disposal of the Directors will enable them to recommend the payment of the full statutory dividend at the rate of £4 8s. per cent. per annum on the consolidated stock (11 per cent. on the old stock) and carry forward £296,755. This comes as a surprise, grateful or otherwise as the case may be. One effect the announcement will certainly produce—it must enhance the interest of Mr. Haward's point about the incidence of sliding-scale increases and decreases of dividend. We have always entertained an uncomfortable suspicion that while the working of the sliding-scale was "all wery capital," as the elder Weller remarked of something else, while gas prices were coming down, it might turn out differently in the case of a substantial rise. This is not because the citizen objects to gas companies paying good dividends, but simply because all the public care for is the selling price of gas, just as in the case of every other commodity. The buyer neither knows nor cares whether the seller of what he wants is on the verge of bankruptcy or is rolling in wealth. He only thinks of the price and quality of the article; and if his thoughts wander to the condition of the merchant, he is pleased to notice the prosperity of a worthy tradesman. Bad and dear wares are in the ordinary man's mind associated with unprofitable commerce. Now, in regard to the sliding-scale of gas companies, some people seem to imagine that the beauty of the arrangement lies in the fact that when the price of gas is coming down, as is usually the case when the settlement is fresh, the shareholders have to allow the public 70 or 80 per cent. of whatever advantage there may be, while they only come in for the small remainder. We do not believe that the public take this view of the matter at all. They want gas as cheap as possible, and they do not care one straw about the incidentals. On the other hand, when the disagreeable necessity arises for an increase of price, what do the public care for the painful circumstance that the shareholders suffer a diminution of dividend which is, after all, only represented by a sum of money six or seven times less than the amount of their surcharge? This effect is described by Mr. Haward as "the reverse "of satisfactory to the consumers." He is merely saying what people are likely to think.

He and others, however, are not justified in merely talking "about it and about." They must discover a policy, if they can by any amount of pondering come by a remedy. We fear that Parliament will prove impatient of any repeated attempt to assert the sanctity of the initial price in the name of the purchasers of premium capital. Only 26 per cent. of the London Gas Companies' stock is of this class; all the rest receiving the full rate of dividend. Mr. Haward should have added to this proportion the capital which has changed hands at the market value since 1876, which would put a different aspect on the case. Still, it is difficult to believe that where Parliament is dissatisfied with the manner in which a gas company has discharged its trust, the delinquents will be allowed to escape unpunished because somebody has bought stock at a premium governed more or less by the standard price. The Directors are the proper guardians of the shareholders' interests; and where incompetency has been permitted to go blameless, the supposed sanctuary of the standard price will hardly accommodate all the applicants for its protection. The shareholders ought to look after the Directors, if necessary. Is Parliament to be stultified by having tried an experiment which is found not to answer? Sir James Rankin's Committee hit upon the standard price as affording an opening for coming to a fresh arrangement of gas companies' finances. The way will not be barred by setting up the notice "No Thoroughfare—Standard Price not to "be Touched." Meanwhile, to the question of what is to be done there is only the answer—wait, and we shall see.

Mr. Livesey on Municipal Trading.

Mr. George Livesey gave evidence this day week before the Committee on Municipal Trading; and a special report of the proceedings will be found in another column. Mr. Livesey had taken the trouble to prepare a proof in opposition to the popular contention that there is something desirable in the principle of municipal trading; and he made some strong points against it in practice. It is not to be supposed that he succeeded in converting to his views those members of the Committee who have adopted the principle; but he nevertheless contrived to demolish several pretty theories, and to bring out some striking facts and figures. There was the streets argument, for example, to which we referred last week. Mr. Livesey said that there is very little in this argument, which is so often used as if it would clench the matter. When local authorities enjoy the sole power of doing everything to their own streets, the public are liable to suffer every bit as much inconvenience, and more, as if a wicked company were laying pipes in the roadway; and the road work is apt to last longer and cost more, in the ratio of the idleness and inferiority of corporation workmen to the employees of commercial firms. And as to the monopoly argument, there is no more tyrannical monopoly than your corporation department, which fears no man, except Trade Unionists with votes. If gas undertakings are to be municipalized, then Mr. Livesey would prefer that this should be done on the Scotch principle of performing the service at cost price. Naturally some of Mr. Livesey's critics on the Committee thought the ratepayers have the power to see that their wishes are obeyed by the Corporation. Theoretically, of course, this is so; but Mr. Livesey insisted that practically the power of the individual ratepayer, or of many unorganized ratepayers, is nothing. Too great subserviency to Trade Union desires; inability to recognize, and disinclination to adequately reward, merit in the higher ranks of their officers; lack of enterprise in opening out new developments; grasping at profits in reduction of rates—these are some of the positive failings Mr. Livesey observes in trading municipalities. Negatively, he denies that they can obtain capital cheaper than statutory companies. Time was when the process of municipalization of gas undertakings was more advantageous than it can be now. That was when the old order of maximum dividends was being changed for the new settlement of sliding-scale and auction clauses. At this juncture, a gas undertaking can usually be bought up to advantage; but not otherwise. It would not pay to buy up a sliding-scale company or any modern gas company enjoying the fulness of its commercial development. Certainly, the consumers would have nothing to gain, and might have something to lose by such a transfer. Generally speaking, Mr. Livesey holds that the proper office of a municipality is to govern, to administer, and to control; and that it loses more than it gains by going into trade, to which occupation neither the constitution of corporations nor the character of their membership is usually well adapted.

The Need for a Coal Commission.

In his address yesterday week to the annual meeting of the Victoria Institute, on "Our Coal Reserves at the Close of "the Nineteenth Century," Professor Edward Hull lent the weight of his authority to the demand which is being pressed upon the Government by Mr. D. A. Thomas, M.P., for the appointment of a new Royal Commission on the question of our coal supplies. We have before now more than once pointed out the need for inquiry into some previously neglected aspects of the subject, and for the bringing up to date of the information and estimates contained in the report of the Argyll Commission of 1871, but have suggested that a Committee of experts would probably suffice. This view Professor Hull's opinions would support, though he speaks of a Royal Commission. We only mention the point because a Committee would be the cheaper and more expeditious form of inquiry.

The questions for consideration are divided by Professor Hull into four groups. In the first place, in the terms of Mr. Thomas's proposed resolution, the persons appointed to investigate the subject would have to determine "the "quantity of coal available for naval, commercial, and "other purposes, contained in the coalfields of the United "Kingdom." For this purpose the information collected by the Argyll Commission would provide a wide basis. In the second place, the question of the area and resources of the "concealed" or overlaid coal-bearing strata would require to be investigated, as we already know of much additional light that has been thrown on the subject by fresh boring experiments in the midland districts and the south-east of England since the 1871 report was compiled. The third branch of the subject is suggested by the terms of reference proposed by Mr. Thomas—namely, "to report "whether any means should be taken to prevent the too rapid "exhaustion of coal, and to preserve it for the use of British

"subjects." This would involve the questions of greater economy in consumption, and of an export duty on coal—the latter one of the most frequently urged panaceas for the present-day ills of the coal consumer. Finally, and by no means of least importance, inquiry should be made into the question as to how far a permanent rise in the price of coal would place our manufacturers at a disadvantage as compared with our foreign competitors, and would induce the importation of coal from America or other coal-producing countries.

In such terms of reference, a Committee or Commission would find scope for much useful work; and their report would be a document of very considerable interest and value to the nation. No one would have better right to a place on the Commission than Professor Hull, whose work on "The Coalfields of Great Britain" was the first, and remains the standard, book of reference on this all-important subject. We trust that the Government will accede to Mr. Thomas's request without further delay.

Four per Cent.

It is but last week that we were discussing the possibility of a rise in the value of money, and, consequently, of the yield on investments. A movement in this direction—whether temporary or lasting depends largely on the course of events abroad—was made on Thursday last, when the Directors of the Bank of England raised their rate from 3 to 4 per cent., at which latter figure it stood from the last Thursday in January until May 24. In the earliest weeks of the year the rate was still higher; so that money has been cheap for only eight weeks of this year up to the present, and is likely, we think, to be dear rather than plentiful for the rest of 1900. As luck will have it, too, the seasons of cheap money generally occur, as in this present instance, when gas companies are lenders to, rather than borrowers from, their bankers. For the next few weeks they will benefit by the higher rate of interest; but when dividends are paid, and the winter supplies of coal have to be purchased at present prices, while the cash for a summer quarter's consumption of gas is coming in, dear money will not have a welcome effect upon the half year's profits. Even, however, were better news from China to cause an easier condition of the Money Market now, we can see no reason to expect anything but a high bank rate in the early winter months.

WATER AND SANITARY AFFAIRS.

The result of the proceedings before the Earl of Camperdown's Committee on the East London Water Bill last week, as reported elsewhere, should be not less gratifying to the water consumers than to the Directors of the Company, as by the passing of the Bill additional storage to the extent of 5300 million gallons will be provided, bringing up the total capacity to 7700 million gallons. It has been the singular ill fortune of this Company to be checked in their endeavours to meet the requirements of their district, and then to be abused for being compelled to curtail the supply of water. Curiously enough, when the Company last year promoted a Bill to obtain power to place their works on a more adequate footing—an object which, one would have thought, would have obtained the unhesitating support of Parliament—their efforts were thwarted by a Committee of the Upper House. Nothing daunted, however, they applied again this session, and have been successful. The works now sanctioned constitute the last instalment of those submitted to Lord Balfour's Commission of 1892-3; and their estimated cost will be £1,338,000. This is a large amount; but its expenditure will be attended with one very desirable result—East London will be safeguarded from any scarcity of water for many years to come. Furthermore, the Company are authorized to take from time to time, with the consent of the Local Government Board and the Conservators of the Thames, an extra 10 million gallons daily from the river, for which privilege they will pay the Conservators £1000 a year. In the House of Commons the Bill met with opposition from the London County Council and other interested parties; but when it reached the Upper House these had all been satisfied with the exception of the Middlesex County Council. A clause was, however, drafted with respect to the supply of certain places in the county in cases of emergency. This met the Council's views, and (with a slight verbal alteration) those of Hertfordshire also. Everything seemed to be in a fair way for settlement, when objections were raised on behalf of the London County Council, who had not petitioned either against the Bill or against alterations therein. The Council urged that the clause would authorize the abstraction of a larger quantity of water from the Thames for the supply of a district in Middlesex which at present has no right to take that water. It was explained that their reason for not presenting a petition was because they thought the House of Lords would pass the Bill as it left the Commons. Lord Camperdown told them, in effect, that they were not justified in entertaining any such idea; and as they had quietly let the matter go on, they had no *locus standi* before the Committee. The clause was accordingly accepted. With the passing of this Bill, the only two London Water Companies in Parliament this session—the East London and the Lambeth—have secured the powers they sought for placing their undertakings on a firmer basis, while the London County Council Purchase and the Welsh Supply Bill were not allowed to proceed. This fact, as pointed out by Mr. Pember, in opening the case for the East London Bill before Lord Camperdown, is significant of the present temper of Parliament on the London Water Question.

We have been having a good spell of tropical weather lately; but fortunately there has been no indication of a falling off in the customary supply of water in the Metropolis. Not even in East London has there been, as far as we are aware, a word of complaint; and therefore it may be concluded that the Water Companies are meeting the extra demands which the exceptional weather is making upon them. This fact, however, did not prevent the "Daily News" from inveighing against the water supply and those who furnish it, in a leading article which appeared on Monday last week. The writer seems to be specially annoyed at the rejection by Parliament of the Welsh scheme of the London County Council, and at the approval by Lord Llandaff's Commission of the scheme submitted to their predecessors for the construction of storage reservoirs in the valley of the Thames, and of the proposal to take the flood waters of that river, as alternatives to the more stupendous undertaking favoured at Spring Gardens. With regard to the last matter, he abuses the Commissioners for following the opinion of "rural" (*sic*) experts, which led them to the conclusion that flood water might safely be taken "if it was drawn "into a storage reservoir before being let in to the filter-"heads" (*sic*). Now, one of the so-called "rural" experts was no less a personage than Sir Alexander Binnie, who, while expressing the opinion that no water should be drawn out of the Thames when it was in a "turbid" state, acknowledged that he could not, without careful inquiry, define turbidity. The other "rural" experts, such as Sir W. Crookes, Professor Dewar, Mr. R. E. Middleton, and Mr. Groves, the Chemist to the Thames Conservancy, failed to see any objection to taking it; and, as the result of all the evidence, the Commissioners came to the conclusion that it was not necessary to "impose any "restrictions" upon the taking of flood water, and that it might be left to the discretion of the Engineers of the Companies to determine how soon after a flood they would draw this water. The writer complains that the Commissioners make light of the fact that waters in times of flood contain more organic impurity derived from sewage than average Thames water. We venture to think they were justified in their conclusion by the evidence laid before them. It is perhaps to be regretted they were not able to avail themselves of the riper knowledge and wider experience possessed by their newspaper critic, as these would doubtless have far outweighed the opinions of the "rural" experts of whom he speaks so contemptuously.

The next point on which the "Daily News" writer questions the wisdom of the Commissioners is their approval of the Staines reservoirs scheme. Here, again, it is regrettable that the Commission of 1892-3 did not have the newspaper man before them as a witness, as he would have opened their eyes to the enormity of the undertaking they favoured so strongly. Far from the scheme being commendable, he would have told them that it was simply a "device for increasing the means of supplying London "with water which always runs the risk of serious pollu-"tion." But on æsthetic grounds he would have roundly condemned the scheme. He tells us that these so-called reservoirs will not really be sheets of water, but "huge

"tanks raised high above the natural surface of the "country." He draws a frightful picture of the disfigurement of the locality by their construction. He asks his reader to "conceive the whole of Hyde Park surrounded "by an enormous bank as high as a two-storeyed "house, completely obstructing the view!" One can conceive this, but the conception will not be in the least like the Staines reservoir now under construction; for there are no houses, or but one or two, near it. In fact, the site was specially selected for its adaptability for the making of such a reservoir, while it was not suitable for erecting residential property. Our sapient and truthful critic complains that the reservoir will have to be built with the "maximum of ugliness--hard, straight banks, "without a curve or a blade of grass." He has evidently never been invited to see the works at Staines, or he would have found that the embankments are to be sown with grass. We are surprised that the writer has nothing to say about the puddle wall being such a flimsy structure that it will give way when the reservoir comes to be filled —breaking the embankments, and liberating the enormous body of water to devastate the country, flood the Home Park, and sap the foundations of the Royal Residence at Windsor! What a chance missed, because readers of the "Daily News" might really have believed this! The writer wants to know why these "monstrosities" are called into existence; and he answers his question to his own satisfaction—to prevent, for a time, London going to Wales. He then asks why London is to be precluded from doing this, and to be put off with makeshifts; and this inquiry he answers by saying it is because the water supply is in the hands of "half-a-dozen monopolist Com-"panies." And we would ask the writer where the water supply of London would have been if the Companies had not come forward to provide it. The writer of the article thinks "the creation of the gigantic tanks which the Com-"mission contemplates should be postponed at least until "the water supply is in the hands of men who will have "only the public good, and not the pockets of shareholders, "to consider." The works now in progress at Staines have received parliamentary sanction after searching inquiry, and when ready, as they will be before very long, they will furnish water for the supply of another million of the population. Before the next instalment of the scheme will be called for, the water-works of the Metropolis may be in other hands, but probably not those contemplated by the writer in the "Daily News." But whether they are or not, if the present works are found to be such "monstrosities" as he makes out, and their so-called "ugliness" is not compensated for by their great utility, there will be plenty of opportunity for him, and those holding similar opinions, to raise objections to the prosecution of any further undertakings of this character.

The "Transactions" of the British Association of Water-Works Engineers—We have received Vol. IV. of the above-named work, containing a report of the proceedings at the annual meeting held in London last year, under the presidency of Mr. W. Watts, M.Inst.M. & M.E, of Sheffield, whose portrait is given as a frontispiece. The technical matters brought before the members were noticed in the "JOURNAL" at the time. Dr. Kemna's paper on "The Biology of Sand Filtration" is accompanied by some valuable plates. The papers and discussions are supplemented by the rules, accounts, and lists of members of the Association. The volume has been produced under the editorship of the Secretary, Mr. Percy Griffith, M.Inst.C.E., &c. It is somewhat late in appearing, seeing that the fifth annual meeting has been held.

The Arrangement between the Welsbach and Sunlight Companies.—Until the terms of the arrangement arrived at between the Directors of the above-named Companies, which resulted in the stoppage of the recent litigation, commented upon elsewhere, have been submitted to the shareholders of the Sunlight Company, nothing official can be published in regard thereto. It appears, however, that, in the circular which has been issued convening a meeting of the Company for Friday next, the consideration is put at £110,000 (the capital of the Sunlight Company being £185,000), by a bond or debenture stock, on which the Welsbach Company will pay a minimum dividend of 5½ per cent., or the purchase money may be paid in a lump sum. Should the stock be issued, it will rank before all the other stock of the Welsbach Company. There are three courses open to the Sunlight shareholders; but the Directors are disposed to recommend the one under which a distribution will be made of whatever remains in hand of the stock after satisfying all claims and liabilities. It is estimated that this will represent about 10s. in nominal amount of stock for each existing share in the Company.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 237.)

THE Stock Markets have had a very poor week. The anxiety produced by the state of affairs in the far East caused general depression; while the unstable condition of the Money Market induced even the professional operator to stand shyly aloof, at all events until the action of the Bank of England on Thursday should be known. In addition to this, the tropical heat indisposed to activity. The net result was that business almost came to a standstill; and it was just as well that the Exchange was closed for repairs on Saturday. Prices in every department have suffered materially. Consols on Friday touched 97¼; and railways were very flat on bad dividend prospects. It is noteworthy that the same section of the Press which condoles with the Railway Companies over a 40 per cent. rise in the price of their coal, has nothing but the most virulent abuse for the Gas Companies who are much greater sufferers in this respect. As was generally expected, the Bank of England rate was raised on Thursday to 4 cent., from the 3 per cent. rate which had lasted five weeks. The state of the reserve required nothing less than this advance. Business in the Gas Market was very slack indeed—in fact, there was hardly anything doing except on the opening day, and even then transactions were very limited. There was no settled tendency either way, but rather a state of suspense; changes of quotations being both few in number and slight in degree. In Gaslights, the ordinary stock opened a point easier, and then remained steady all the rest of the week, unmoved by the announcement that the dividend to be paid next month will be at the rate of £4 8s. per cent., a reduction of ½ per cent. off the last-declared dividend. This reduction is imposed on the Company by their most recent Act, which enacts that a rise in price made at any time in the course of a year shall reduce the dividend over the entire year. The provisions of the South Metropolitan Act are somewhat similar; but the Commercial Company are not affected in like manner. There was very little business in South Metropolitan; but the quotation was lowered a point. Commercials were quite quiet and unchanged. In the Suburban and Provincial group, business was almost at dead low water; and the only feature was a slight recovery in Alliance and Dublin. Matters were equally quiet among the Continental Companies. The only change was a fall of a point in Imperial; but the actual prices recorded for the few transactions which were marked did not show any shrinkage. Among the undertakings in the remoter world, the only move was a slight reduction in Buenos Ayres. Business in Water was almost devoid of feature; but New River fell slightly.

The daily operations were not of a character to demand detailed notice. On Monday, Gaslight ordinary fell 1. On Wednesday, South Metropolitan fell 1, and Buenos Ayres ¼; but both Alliances rose ⅛. New River fell 2. On Thursday, Imperial Continental fell 1.

ELECTRIC LIGHTING MEMORANDA.

The Opposition to the Electric Power Bills—American and British Lamp Practice—The Case of St. Pancras—An Insolvent Undertaking.

THE subject of municipal trading crops up again in a special "Times" article on the Electric Power Bills. The writer tells over again the story of the rejection last year by the House of Commons, at the instigation of the Association of Municipal Corporations, of the Bill for providing electric power in bulk in a Midland area. He calls this Association a Trade Union of the officials of municipal corporations, and ascribes to its influence the persistence of the municipal dog in lying in his manger to the distress of the electrical animal. This is a left-handed compliment to the electricity-generation-in-bulk people; but doubtless the writer meant well. This year, he says, a determined effort was made to dislodge the municipal dog; and so strong was the attack that the corporations gave way for the time being. The Power Bills were sent upstairs, where three out of four of the schemes were passed by Sir James Kitson's Committee. Now, it appears, the indomitable Association of Municipal Corporations have decided to take advantage of all the forms of the Houses in order to upset the findings of the Committee. This is condemned as an outrageous proceeding. It at least shows once more that when municipalities think their commercial interests jeopardized, they care not how the public suffer so long as they are protected. A little municipality with a puling electricity supply undertaking struggling along with the utmost difficulty at a selling price of 8d. per unit, arrogates to itself the right to bar the way of a great power company who propose to supply an extensive district with electricity in any quantity at from 1d. to 2d. per unit. What it could scarcely do for itself it arranges to get done through the Association. The worst of it is that with a little luck the machinations of the municipalities may possibly succeed.

How differently altered circumstances affect questions of policy appears very strikingly in the contemporary conditions of the electric incandescent lamp trade of this country and America. It has to be remembered that consumers' electricity meters are not much used in the United States, most of the business of

electric lighting being done upon a rental basis. The companies do not publish their accounts, nor show their profits; so that they are perfectly free to quote private terms to favoured customers, or, indeed, to make money by any and every device at their command. This being the case, they find it pays to give particular attention to the working of lamps, and they frequently supply all lamps gratis to their customers. The cost of the electricity which a lamp uses, or wastes, in its lifetime being very much greater than the price of the best lamp itself, it is good business for a rental company to co-operate with the lamp manufacturers for the production of an economical lamp, and then to see that the consumer uses no other. In England, the opposite conditions prevail. Not only is the supply of electricity usually by meter, but the undertaker is forbidden by law to prescribe the kind of lamp to be used by his customer. This prohibition is not absolutely embodied in central station practice; but its spirit remains and animates the presumption that the lamp is the consumers' affair. Of late years, as it has often been pointed out, the consumer has been victimized by having a high-voltage lamp thrust upon him—a kind of lamp which the knowing American supply company does not patronize.

That famous example of municipal electricity supply, the St. Pancras Vestry electric lighting undertaking, supplied the accounts which were analyzed in the last issue of the "Electrical Review." As our contemporary very justly remarks, the annual accounts of this Vestry's undertaking are always looked out for as the time for their publication comes round, for a variety of reasons. It is one of the oldest of local authorities' ventures of the kind, for one thing; and it has always exhibited some curiosities of capital or revenue, or both. After seven years, the business is still growing, and the capital expended now stands at £288,147. The average price per unit sold is 4·29d., and there was a gross revenue of £45,066 for the past year, of which £17,650 is entered as gross profit. It cost to generate the unit 2·66d., whereof coal stands for 0·92d. This fact ought to be enough to explain to silly persons in technical colleges and on local authorities why dearer coal does not hit the electric lighting business so hard as it does gas manufacture. The electrical engineer's coal bill is a heavy one, the heaviest he has to pay indeed; but it only accounts for one-fourth or one-fifth of the price he has to charge for his unit. Capital charges are his bugbear. St. Pancras had last year to find £7321 for interest on loans and £3374 for sinking fund payments. This was under 4 per cent.; so that the full burden cannot have come on for the gross amount of capital shown. Be this as it may, interest and sinking fund left a "net profit" of £6955, which was appropriated as follows: Depreciation of accumulators, £1000; depreciation of meters, £600; to the credit of the lighting rate, £2000; to reserve account, £4000; to cover bad debts, £112; the remainder being carried forward.

It is hardly necessary to point out that this is not making both ends meet. A gross profit of at least 7 per cent. on the capital expended is the smallest out of which adequate provision can be made for interest—say, 3 per cent.; sinking fund (say) 1¼ per cent., depreciation (say) 2¾ per cent. Afterwards such matters as reserve fund can be provided for, if there is money enough. Here is St. Pancras, after seven years, with nearly £300,000 to pay interest upon and redeem; and not one penny can be spared yet for general depreciation of machinery or mains. It is playing with the business to allocate £1000 a year to depreciate batteries—who knows what these things are worth?—and meters with £600. The Vestry supply 315 arc lamps, mostly employed in street lighting, for which they pay themselves. We mentioned the state of the finances of the undertaking last month, when the other leading electrical journal published an analysis of the accounts; but no apology is needed for returning to the charge, inasmuch as the example is a very conspicuous one. Surely, if St. Pancras cannot now show a clear balance-sheet, its chances of ever doing so must be getting thin. And if the St. Pancras Vestry electricity supply undertaking is not a paying business, where shall the advocates of municipal trading find a more favourable field for the application and development of the principle? They cannot complain of the difficulty of having over-cheap gas to contend with, at any rate.

THE "ENGINEER" ON THE LONDON GAS BILLS.

The parliamentary dealings with the gas supply of London have been treated by the "Engineer" with the respect due to the importance of the subject. It is greatly to be desired that other journals of the first rank would do likewise; for in this way knowledge is spread. The gas industry has notoriously always suffered from the ignorance of ordinarily well-instructed people as to its peculiar conditions and necessities. On this occasion, the "Engineer" has endeavoured to do justice to the subject, and has devoted two long ably-written articles to the Bills brought before Mr. Oldroyd's Committee. The first article, which appeared on the 6th inst., dealt with the Portable Photometer Bill of the London County Council and that of the Gaslight and Coke Company, and did so in a style that redounded greatly to the writer's credit. He evidently knows all that it is necessary to know about the photometry of gas; and he denounced the County Council Bill in good set terms, as a trustworthy and independent expert should. He dismissed as unsatisfactory the case sought to be made by the witnesses for the County Council out of their secret detective testings, and applauded the decision of the Committee for refusing to give the Council "power to harass the Gas Companies" by peripatetic penalty examinations. With regard to the Gaslight and Coke Company, he was sharp enough to see that the Company's Bill was lost because it ignored the findings of the Powers of Charge Committee. Everybody outside the Horseferry Road can tell what is the matter with this Company.

When the writer in the "Engineer" comes to deal with the South Metropolitan Company's case, which he does in the current number, he betrays a certain degree of feebleness in grasping the issues deliberately raised by the Company, which we trust to be able to cure by offering a little further explanation. That he has tried to follow the matter in all its ramifications is shown by his having collated the part of the Company's case relating to the illuminating power of their gas with Mr. Webber's Gas Institute lecture. He is highly complimentary to Mr. Webber individually, but holds opposing views as to the merits of "simple coal gas" for London. He sums up these views in the statement that he can see no reason "why simple coal gas should be adopted in London, in place of a mixture of coal gas and carburetted water gas of 16-candle power. The arguments in favour of the adoption of simple coal gas are, in reality, yet more forcible arguments in favour of simple water gas. For the present, we believe that the 16-candle power mixture supplied on the north side of the Thames is the most advantageous supply from the general consumers' standpoint. Later it may be advantageous to lower the illuminating power, by increasing the proportion of simple water gas in the mixture. We believe the South Metropolitan Gas Company have taken a retrograde step in obtaining powers to supply simple coal gas, and have made a wholly irrational movement in offering flat-flame burners gratis to consumers. *Do they thereby hope to stem the increasing use of incandescent lighting?*" The italics are ours. This sentence, in conjunction with an earlier remark that "it is to the present interest of the Company to keep the flat-flame burners in use, since even Mr. Sugg's latest pattern burner consumes fully five times as much coal gas as does an incandescent burner affording the same light" betrays a singular narrow-mindedness in the writer, and shows him to be no gas engineer. Why, this is the stupid old calumny that used to be cherished by the amateurs of the Welsbach system to explain the suspicion that members of the gas engineering profession undoubtedly entertained at first as to the serviceability of the invention. We are almost ashamed to repeat the assurance that gas managers know on which side their bread is buttered. It is rather disheartening to find, at this time of day, the "Engineer" gravely declaring that an extravagant burner is the gas companies' best friend. The fact, however, only goes to show how difficult it is for outsiders to understand even the first principles of the gas business. It is particularly sad and stupid of anybody to talk in this way of the South Metropolitan Company, who have done more than any other London Gas Company to help the local authorities to the incandescent system for street lighting.

But having set our contemporary right on this point, how can we convince him that so far from the South Metropolitan Company having taken a retrograde step in breaking with the tradition of 16-candle gas, they are putting themselves in a position which can be defended on the soundest economical, technical, and commercial grounds? He does not accept the case made out by the Company's witnesses to the satisfaction of the Committee, and amplified in Mr. Webber's lecture. We are afraid that if such a mass of proof does not convince him, nothing will. It is therefore hopeless to go over this ground again; and so we will take what new points he has to offer against the proposal of the South Metropolitan Company which the opposing experts, whom he justly regards as having been discredited by their performances on the County Council Bill, failed to bring before the Committee. Supposing that the "Engineer" writer had been in the room, what would he have said to the Committee? Apparently, that the Company ought not to be permitted to give their consumers flat-flame burners better suited than those hitherto in general use, for burning uncarburetted gas. Also, that if the Company want to "let down" their gas, they had better do so by the addition of "simple"—that is, uncarburetted—water gas. But surely, this writer ignores the obvious objection to any considerable addition of plain water gas to the ordinary supply of our towns. He forgets, also, that English gas companies must make coal gas in order to obtain the coke for water-gas generators; and he is plainly ignorant of the fact that natural, or simple, coal gas is the cheapest gas that a London or any other British gas company can possibly send out to the customers. The South Metropolitan Company wanted the simplest and most intelligible of reliefs from an obligation to "doctor" their gas. Their opponents raised the objection that the drop of from 16 to 14 candles illuminating power would injuriously affect the users of flat-flame burners; and it was to overcome this objection—whatever it might be worth—that the Company offered to give the people the most suitable burner procurable for the purpose. This is the "irrational movement" complained of by their critic of the "Engineer."

But, the critic goes on to remark, if the Company had really believed all that Mr. Webber had to say about the coming of incandescent lighting, they should have offered to supply not flat-flame but incandescent burners, and gone in for "straight"

water gas. He again forgets the patents and the prices. We have already touched upon the objection to distributing water gas pure and simple. Suffice it to say that this is not done anywhere, even in America. It is not the case that in Germany simple coal gas is made because the duty on petroleum renders carburetted water gas prohibitively dear, but because it is the natural product of the cheapest available coal. We do not believe that in Germany, as the "Engineer" declares, the fashion of gas manufacture will change from low-grade coal gas to Dellwik water gas slightly carburetted with benzol vapour. Such a mixture is of too low a calorific power. It may answer in the case of a new undertaking, where all the conditions can be adapted to the particular requirements; but it is not practical gas politics for a London Company. The "Engineer" alleges that the supply of simple coal gas at the present day in London "is an illogical proceeding." On the contrary, it is a most reasonable arrangement, as the evidence abundantly proved; and no amount of "logic" would suffice to obtain a London Gas Company permission to distribute uncarburetted water gas, which the writer seems to prefer. For logic, however, commend us to this passage:—

> We have already spoken of carburetted water gas, which may be produced of practically any desired illuminating power. In many places, 14 or 16 candle power carburetted water gas can be made as cheaply as coal gas, and forms 50 per cent. of the gas distributed. If made of somewhat higher illuminating power, it will, when added to 14-candle power coal gas in proper proportion, give a mixed gas of over 16-candle power. Such a mixed gas is supplied to the greater part of London; the South Metropolitan Company's district excepted. Its cost should not be, and is not in many cases, more than 1d. per 1000 cubic feet greater than the cost of simple coal gas. We have not forgotten in making this statement that the oil used in the manufacture of carburetted water gas now costs about 5d. per gallon. The consumer of gas for heating purposes will often need to burn 5 to 10 per cent. more of this mixed gas than of coal gas. This is its sole disadvantage.

That is all! The consumer will only need to pay an increased gas-bill of from 5 to 10 per cent., in quantity, and a rate per 1000 cubic feet which "should not" be more than a penny higher than is necessary. It scarcely seems likely that Parliament would listen patiently to such a tale. The "Engineer" contends that this mixed gas will be burnt to greater advantage than simple coal gas in "the flat-flame burners best adapted for the gas in each case." Here we have the bad old argument of the County Council experts over again—that the least efficient type of burner is to govern the gas industry in perpetuity.

Nowhere does the "Engineer" recognize the necessity for maintaining the calorific value of town's gas, however made, at about the standard to which the public are accustomed, which is the core of the whole matter. Instead of keeping this simple rule in view, we get such a passage as the following:—

> Simple coal gas has a considerably higher calorific power than simple water gas, but affords a flame of much lower temperature. Broadly speaking, simple coal gas has twice the efficiency of simple water gas for most heating purposes; while in incandescent burners simple water gas affords twice the lighting duty of simple coal gas in similar burners. Simple water gas can be produced under the Dellwik process for about one-fourth the cost of simple coal gas. Hence, if there were no other than these two applications of gas, water gas would, in virtue of its cheapness, supplant coal gas. There remains, however, the chief application of gas—viz., lighting by self-luminous flames, for which simple water gas is useless. As soon as this application ceases, coal gas must give place to simple water gas as the staple supply throughout the country, unless it can be produced at about half its present cost.

Observe the data assumed here. It is admitted that the simple water gas is only of about half the fuel value of coal gas, which means that double the quantity must be put in circulation. Passing over the claim for a double efficiency with incandescent burners, we learn that Dellwik water gas can be made for about one-fourth the cost of simple coal gas. From what? Is it so certain that, even if this were true, it would pay to distribute water gas? If the writer had been a gas manager, he would have known that the cost price of gas into the holder is not everything. Taking his own claims as they stand, by the time his Dellwik gas reached the London consumer, through the complaisancy of the Home Office, the latter would not find his gas-bills very materially lightened.

In conclusion, we hope and believe that our colleague of the "Engineer," who must be friendly to the gas industry in his heart, will not be justified in his dismal foreboding that "gas consumers in South London will be sufferers by the gas legislation of the present year." Whatever the result may be to the Company, the consumers have been more than compensated by the terms upon which the Company have agreed to alter the character of their supply. The whole face-cost, and very much more, of enrichment has been given to the public; and the Company will have to get down to 2s. per 1000 cubic feet before the shareholders will be as well off as they were under the old settlement. There will be no carburetted water gas in that cheap article, whenever it is put upon the market.

In the course of a paper which appears in the "Proceedings" of the Institution of Civil Engineers, Mr. G. J. Morrison gives the following rule for gauging concrete, which he says he has always found satisfactory: Decide tentatively on the quantity of large and small stones, if necessary trying two or three proportions. Add sand by degrees till the mixture, after being well turned over and shaken down, shows a decided increase in bulk (at least 5 per cent.); then add cement to an amount equal to between one-third and one-half of the sand.

LORD AVEBURY ON MUNICIPAL TRADING.

Public attention is, we are glad to observe, being increasingly drawn to the practical questions involved in the craze for the municipalization of public services generally without regard to the expediency of every such particular enterprise. It is always so much easier to catch the public ear with clap-trap generalizations which herald the approaching regeneration of society, than to get citizens to listen when it is sought to measure the practicability of well-sounding theories by the standard of hard facts and actual experiences. The callow politician who knows how to set everything right, but who excludes from all his calculations the factor of human nature which dominates all systems and all societies, can always command so large an audience of persons less informed than himself, that it is very necessary that men of practical experience should, from time to time, infuse into the discussion a corrective of common, work-a-day sense. We, therefore, welcome the appearance, in the current number of the "Contemporary Review," of a statement by Lord Avebury (under which name it is necessary to remind oneself that one is meeting Sir John Lubbock of yore) of some of the many objections to which not a few of the proposals for widening the scope of municipal enterprise are open.

Lord Avebury reminds us that the old school of Radicals (Mill, Fawcett, Cobden, and Bright) were all strongly opposed to any form of trading by governments and municipalities, and remarks upon the fact that the new school of Radicals—or, rather, Progressives—have deserted entirely those principles of their political forebears, and "seem to consider that we might place over any municipal buildings the motto which Huc saw over a Chinese shop: 'All sorts of business transacted here with unfailing success.'" That is not the only respect in which the principles of the earlier school of reformers have fallen into disrepute; but principles are stronger than fads, and their truth will remain and be recognized when playing to the democratic gallery at the expense of the public welfare has met its due retribution. Lord Avebury gives a compendious list of the varied businesses which it is now suggested that municipalities should undertake; and we may note, in passing, that among them is to be found the following rather curious example of the author composing and the compositor disposing: "Manufacture of electrical fitting of the residual products of gas." What Lord Avebury wrote was probably something different. He then first enumerates, and afterwards amplifies, the principal objections which he sees to indiscriminate municipalization. The first he puts forward is "the enormous increase of debt which such a policy will involve," the present indebtedness of local bodies (somewhere about £250,000,000) being given prominence, and an estimate made of the probable addition thereto which would follow from the taking over of the gas and water companies, housing schemes, tramways, &c. "Add on," says the writer, "the capital required for manufacturing, and it is evident how enormous our local indebtedness will become if some check is not put to the present tendency." Now we do not think that this is by any means the strongest argument to bring forward against the Progressive programme—at any rate, not as Lord Avebury shapes it. What is there specially alarming or financially unsound in a local debt, as such? The whole question is whether the debt is justified by the possession of an asset of equal value. If so, what matter how large it be? It cannot be argued that while a company may owe its debenture-holders a million sterling and be prosperous, that a corporation is necessarily in a state of financial rottenness if it take over the same property and owe the same amount to the same or different people. The question is, can the corporation maintain the property at the same value by equally good management of its affairs. If so, what matter the size of the loan?

We are sorry Lord Avebury should have weakened his case by putting his least powerful argument to the front. It gives the "Progressive" a fair chance for a reply, an opportunity promptly seized by the "Speaker," which, in a carping review of the "Contemporary" article, remarks, not untruly, that "if he (Lord Avebury) were talking of railways or banks he would call this 'alarming growth' an increase of *capital*." Here, however, the accuracy of the "Speaker's" criticism begins and ends. For this is the sort of argument that follows. Lord Avebury, it is said, forgets "that there may be a public benefit in the municipalized management of works and tramways which cannot appear on a mere balance-sheet." (The contemptuous allusion to a "mere balance-sheet" is delightful; so many municipal enterprises would cut such a poor figure on a "mere balance-sheet," if the same were honestly compiled!) This intangible benefit, we are told, "is obtained by increasing that advantage to individuals which Professor Marshall has called 'consumer's surplus.'" We may, proceeds the writer, "illustrate our argument by a hypothetical case. A company sells 100 million feet of gas at 3s. per 1000, and makes a profit of 1s. 6d. a foot (*sic*)—*i.e.*, £7500. If the price is reduced to 2s. 6d., the consumption will be increased by one-half; leaving the profit precisely the same. Now to a company this will be no inducement, for it gains nothing; but a town council, on the other hand, would be certain to make the reduction, because, without throwing any burden on the rates, it could relieve every consumer in the town of one-sixth of the price of his gas. The council, perhaps, might be willing to reduce the price, even if the expected increase of consumption were only one-third,

because the saving to the consumer would be much greater than the loss to the rates—*i.e.*, the community would gain."

We have quoted this precious argument in full, as it is a splendid example of the commercial ignorance and loose thinking of the Progressive journalist. Indeed, taking into consideration the brilliancy of the whole argument, we cannot but regard the little slip about making a profit of 1s. 6d. a "foot" as illuminative. It is said that figures can be made to prove anything. Undoubtedly they can—if you are allowed to start with a hypothesis and proceed with arguments suited to the desired end. Observe the simplicity: "If the price is reduced to 2s. 6d., the consumption will be increased by one-half"—nothing could be more obvious—"leaving the profit precisely the same." There you are; now you have only to proceed to your conclusion! But there are just one or two remarks to make. In the first place, it is assumed in the hypothetical case instanced, that the cost of manufacture and all charges for management would remain the same per 1000 cubic feet if 150 millions were consumed as if only 100—an assumption worthy of a writer who says that Lord Avebury's article "would hardly convince a City clerk," but one which only requires to be stated for its absurdity to be seen.

Further, if the profit of 1s. 6d. per 1000 cubic feet in the first instance were made after paying interest on capital, then, in the second instance, it is assumed that the charge for capital would be as great per 1000 cubic feet on the increased quantity; while, on the other hand, if the £7500 had to pay the charge for capital, then either the town council would be out of pocket by the interest on all additional capital required for the supply of the extra 50 millions, or else the writer has assumed that no extra capital would be required. Of course, to men who have the slightest acquaintance with business, it need scarcely be observed that if any company charging 3s. per 1000 cubic feet could be certain of securing a 50 per cent. increase of consumption by reducing its price to 2s. 6d., the managers would send out notices of that reduction as soon as they could be printed. The last sentence in the quotation we made is simply nonsense. Carried to its logical conclusion, it is an argument in favour of a town council supplying gas free. This would not matter if every ratepayer were a consumer of gas in exact proportion to his assessment, which is just what he is not. Were it so, however, how could the consumer gain more than the ratepayer lost?

To return, after this long digression, to Lord Avebury's article. The second objection urged is the check to private enterprise which would ensue upon the municipality, with the rates as a financial backing, entering into the arena of general commerce. If it be urged that the representatives of the ratepayers will not carry on business at a loss of the ratepayers' money, Lord Avebury replies that, unfortunately, the electors are by no means all ratepayers, and that, in such cases (London particularly), "electors feel little interest in economy." Moreover, we have only too good cause to fear the accounts of municipal authorities often do not make it sufficiently clear to ratepayers what the real profits or losses on their enterprises are.

The third objection brought forward is the impossibility of municipal councillors devoting sufficient time to their duties to properly supervise all the enterprises which it is suggested they should undertake. The tendency would be, were the already heavy duties of municipal administrators increased, to reduce the number of business men who would seek election, just when business capacity would become more and more in demand. Then the undesirability of increasing the number of municipal (or state) employees so often urged in the "JOURNAL," is emphatically stated and some striking illustrations given from the experience of the Australian State Railways; and, finally, the risk of loss without a corresponding possibility of gain is pointed out—concerns managed by persons only indirectly interested being more liable to loss through inattention to detail and want of zeal, than those which are conducted by their direct owners for personal gain.

Lord Avebury concludes with three suggestions—namely:

(1.)—That no extension of municipal trading for purposes not yet sanctioned should be permitted, except after full notice, and special parliamentary inquiry.

(2.)—That, as regards water, lighting, tramways, and telephones, fresh undertakings by municipalities should only be sanctioned if it can be shown that there are special reasons why they should be carried on by the municipality rather than by private enterprise.

(3.)—That any ratepayers objecting should have a right to be heard, and give their reasons for opposing the Bill.

These suggestions, like the preceding article, will not be appreciated by the megalomaniacs and collectivists; but it is high time that the public should be made to hear both sides of the question, and we welcome Lord Avebury's contribution to their enlightenment.

THE QUESTIONS BEFORE THE DEPARTMENTAL COMMITTEE ON PATENTS.

[SECOND NOTICE.]

THE second of the questions referred to the Departmental Committee was: "Whether any, and if so what, amendments are necessary in the provisions of Section 22 of the Patents, &c., Act, 1883." This, as our readers will be aware, is the famous section instituting compulsory licensing. The wording of the reference is noteworthy for strength, the use of the word "necessary," instead of desirable, or expedient, in this connection being no accident. In truth, there is nothing more debatable in the whole range of patent law and practice than the subjects embraced by Section 22. The principle involved is absolutely new in English law; and, as will be remembered, the section remained dormant for many years. Yet in his well-known book on "The Law and Practice of Patents," Mr. Roger Wallace, Q.C., pointed out that the utility of a system of compulsory licenses was fully discussed at the Vienna Congress, and passed by a large majority. He remarks that it is likely to prove of great public benefit, especially in regard to the case of foreign inventors who take out patents in this country without any intention of working here but merely to prevent any competition in this country. This was precisely the ground upon which the section was eventually put in motion. The peculiarity of the provision is that it is never likely to be made use of, except in respect to commercially valuable industrial property; so that the procedure under it is essentially of a contentious character. Still, the moving of the Board of Trade to give effect to the section need not necessarily be a costly business.

We have characterized the principle as new to English law; and this is probably the true reason why an inquiry into the working of the provision has been ordered. A patent is property like any other, after it has once been granted by the Crown; and it is a quality of property that the owner can do what he likes with it, so long as he does no wrong thereby to the rights of others. Many inroads have been made in the major interest of the public upon the absolute right of a man to do as he likes with his own; but before the enactment of Section 22, it was open to the holder of letters patent to work under them or not, as he pleased—just as a landowner has discretion as to whether he will develop his estate, or let it remain unproductive. The property in patents, however, being granted by the Government, for the public good, several countries have made it a condition of the continuance of the patentee's protection that he should make adequate use of his patent by working it in the country. This expedient has not commended itself to the best judgment of Englishmen of experience in such matters, for reasons that need not be repeated here. Suffice it to state that the principle of compulsory licenses was accepted in 1883 as an improvement upon that of compulsory working, inasmuch as it would be likely to more effectually prevent patentees from playing the "dog-in-the-manger," which is really the object desired. At the same time, it is a strong proceeding to order a patentee to part with his exclusive right of manufacture and sale under his patent for the benefit, generally speaking, of a trade rival. Mr. Wallace did not adequately discuss the provision in his book; but last year Mr. J. W. Gordon published a work specially on the subject of compulsory licenses, so that nobody need be ignorant of the far-reaching character of this alteration of the law.

Writing as a lawyer, Mr. Gordon was naturally most concerned with the remarkable circumstance that the powers of Section 22 were withdrawn from the High Court and vested in the Board of Trade. He thought it a most serious thing that so important an alteration of the law of industrial property should be made outside the jurisdiction of the High Court, and at the discretion of a Government Department. He hoped the result would be satisfactory; but, metaphorically speaking, he shook his wig over the whole arrangement. That the transfer of jurisdiction in this sense was not without justification, however, was regretfully conceded by Mr. Gordon himself as a consequence of the remarkable judgment in the case of the *Incandescent Gaslight Company v. Cantelo*. He characterizes this decision as tantamount to a refusal to entertain any question of the public convenience as against the pretensions of a patentee. Doubtless, this subject of the competency of the Board of Trade to protect the public and others interested in a patent from unreasonable and prejudicial conduct on the part of a patentee; and the bearings of the leading case just mentioned, will be thoroughly investigated by the Committee. It is as well to recall some part of the astounding dictum of the Court in this case. The Judge said that "the patentee has the sole right of using and selling the articles, and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them, or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person to take a license, 'Mind, I only give you this license on this condition;' and the purchaser is free to take it or leave it, as he likes. If he takes it, he must be bound by the condition." If this is the law, then the drastic reform of it by means of something like Section 22 of the Patents Act, 1883, would have been imperatively called for now, if it had not already been enacted.

The short cut to equitable dealing with patentees in virtue of Section 22 is therefore likely to leave the High Court very high and dry in this matter. "Any person interested"—the words are very general—can petition the Board of Trade for a grant of a compulsory license on reasonable terms. The petition must show that the patentee has been unreasonable in the matter of

granting licenses; that the patent is not being worked; that the reasonable requirements of the public with respect to the invention cannot be satisfied; or that the petitioner is prevented from working or using to the best advantage an invention of his own. It must show, in short, the nature of the petitioner's interest in the matter, and state what is required by way of remedy or relief. It should be premised that the petitioner must mean business, for the Board of Trade will not listen to mere paper declarations. The application is then handed over to an independent legal expert—practically one of the Counsel practising in patent cases—who gives his opinion as to whether there is a sound *primâ facie* case for proceeding further with it. If he decides to the contrary, the Board of Trade may dismiss the petition out of hand. Otherwise, the same Counsel will be appointed as Referee to hear the case for the Board, and he proceeds to put matters in train for the hearing, according to the rules. Ultimately, the settlement is an arbitration by a single arbitrator. Nothing like a fishing inquiry is permitted. The petitioner tells what he wants, and why, and what he is willing to pay for it; the objector puts his own case; and the Referee decides between the parties. Not publicly, however; the report of the Referee is treated as a private document, and the decision of the Board is announced by a formal notification from the office.

Naturally, in discussing the procedure under Section 22, Mr. Gordon lays most stress upon the formal and regular operation of the Board. Practically, a great deal may be and probably is done informally and under the imposing presence of the section as a background. A firm contemplating the marketing of a new speciality find the course barred by the existence of an opposing patent. What are they to do? What is the patentee to do? This depends entirely on the parties and their circumstances. If the respective parties are big people who mean business, and if the validity of the patent involved is admitted, Section 22 comes in very handy. A obtains B's terms for a license; and if he has reasonable grounds for objecting to them, he goes to the Board of Trade and has a chat with an Assistant-Secretary on the subject. The matter may not go further, if the parties are honestly desirous of striking a bargain on business lines. Suppose, however, that the patentee is weak, while the other person interested is strong, what is likely to happen? There is no converse to the power of the person interested to demand a license, in the shape of a right of appeal on the part of the patentee to the Department to order the other person to take a license on reasonable terms. The poor patentee, however, has the protection of the other person's interest. If a firm mean business, and there is a patent in the road, it is clearly to their advantage to purchase on fair terms, and so acquire whatever value may attach to it. This, however, by the way.

It will be interesting to follow the evidence and the observations of the Committee on the operation of the system of compulsory licenses. Most probably the chief alteration to be suggested will have reference to costs. It is difficult to see in what other respect the procedure can be changed for the better; but the opinions of Mr. Roger Wallace and Mr. Bousfield, who have been Referees several times, will naturally weigh with the Committee. Mr. Wallace, who heard an incandescent gas-burner petition which was eventually dismissed, commented strongly on the unfairness to patentees of making them pay their own costs in any event. Where the application is refused—an application that perhaps ought never to have been made—the patentee certainly ought to be protected from this impost.

We have nothing particular to remark concerning the third and last question referred to the Committee—the suggested extension of the period of grace prescribed for applicants under international arrangements under Section 103. This provision was a considerable improvement on the old law. The question appears to be one of procedure, as to which the experience of patent agents should guide the Committee. No fresh principle is involved, the only point left for the Committee being the question of time. It will be understood from these notices of the reference that the work of the Committee will be of great interest and importance to inventors and the general public. At the same time it is a notable testimony to the soundness of the settlement arrived at in 1883 that so few questions relating to the possible amendment of English patent law and Patent Office practice are regarded as still open; and there are no complaints that the reference is too limited.

THE GAS SUPPLY OF BOSTON (MASS.).

(*Continued from p.* 149.)

THE history of the Companies supplying gas to Boston has, in former articles, been brought up to the time when the Bay State Company of Delaware were in control of four of the principal Gas Companies, and were, by various methods peculiar to themselves, reaping a fine harvest from the public. We have now to consider how, and with what success, it was sought to bring that Company to terms more favourable to the consumers. It will be seen that the attempts made were not always solely in the interests of the public, but in some cases owed their inception to a desire on the part of other financiers to obtain a share of the plunder that was to be had.

The principal attack upon the Company run by Mr. Addicks was made in 1893 by the then Mayor of Boston, Mr. Nathan Matthews, and was, as afterwards became evident, due rather to a desire to win popularity for his (the Democratic) party in the State, than to a disinterested concern for the public welfare. Were that party to continue in power, he, the Mayor, had high hopes of becoming the Governor. Hence a sudden and mighty zeal for the welfare of the gas consumers. By an amendment of the City Charter in 1885, the administrative powers had been largely centralized in the hands of the Mayor; and Mr. Matthews interpreted the law as giving him power to grant leave to other Companies to enter into competition with existing gas undertakings in Boston, without obtaining the consent of the Aldermen of the city. With this interpretation the Aldermen vigorously declined to agree, but were unsuccessful in their protest against the Mayor's supposed illegal actions. The plan of campaign against the Bay State interests entered into by Mayor Matthews makes interesting reading.

The opportunity for attack was afforded by the expiration, in 1893, of the five-year contracts for public lighting; and for the purposes of the campaign another Company were brought into prominence—namely, the Brookline Company. This Company, under their Special Charter, had the right to lay mains in Boston (of which Brookline is a district), "with the consent of the proper Local Authorities." This consent the Mayor assumed the right to give, and did give. What inducement was there, however, to the Brookline Company to enter into competition with the Bay State interests? This—that the former was backed and practically owned by the magnates of the Standard Oil Company, who have had for years past a virtual monopoly of the naphtha used for enrichment purposes by the water-gas manufacturing companies in the States, and who, by reason of this monopoly, were enabled to buy up on most advantageous terms many of the considerable gas undertakings of the country. In the course of some of these movements to acquire the works to which their naphtha was an essential, the Standard Oil Company had come into conflict—at Buffalo, Chicago, and elsewhere—with Mr. Addicks, already mentioned as the controller of the Bay State interests; and the Company were therefore only too pleased to seize the occasion of doing him an injury, if possible, in Boston.

It has before been noted that the public began to call for inquiry into the charges of the Gas Companies run by the Bay State Company in 1892; and in June of that year, the leading Democratic newspaper began to work up an agitation, having for its cries: "Down with the Gas Trust," and "Give us dollar gas." Following on this, the Mayor gave the first place to the question of the charge for public lighting in his inaugural address at the beginning of 1893; recommended a reduction of $65,000 in the annual appropriation for the lighting department; and "gave notice that the Gas Companies must come down." The reduced appropriation was passed by the Aldermen on the 31st of January, and shortly afterwards advertisements inviting tenders for the public lighting of Boston appeared in the New York and Boston newspapers. Bidders were, in addition, requested to state the price per 1000 cubic feet at which they would furnish gas to consumers other than the City authorities; and the city was, for the purposes of these tenders, divided up into nine districts.

The Brookline Company sent in bids for the public lighting of the greater part of the districts which were in the area of their own supply and in that of the Bay State Companies; the prices quoted being: To the city for street and other lighting $1·25 per 1000 cubic feet, and to the private consumers $1·50 in the Brookline Company's Brighton district. In the Bay State districts, they were: 70 c. per 1000 cubic feet to the city, and $1 to the private consumers. The Bay State Companies did tender, but ignored the special districting of the city; each Company bidding for the lighting of the streets in their own area, while no quotation was made for other than public lighting. With these tenders, however, were sent in proposals that the Companies should take over from the city the lighting, extinguishing, and maintenance of the street-lamps—work which cost the city $50,000 annually. It is of interest—as bearing on American gas and municipal politics—to note that the Mayor admitted in evidence that the Lamp Department (which existed to execute the work in question) cost Boston more than twice as much per lamp as other cities paid their Gas Companies for the same services, and that Boston was about the only city that had such a department. The Mayor defended the continuance of the system on "administrative grounds"—whatever that might mean—but he was publicly accused of maintaining it at the expense of the city "to save for himself one hundred and thirty odd political votes." Municipal traders please note.

The Brookline tenders were at once accepted, and contracts signed forthwith for three years certain, which, however, were, at the option of the City, to continue at the same prices until abrogated by the Mayor. Subsequently, in August of the same year, the other Companies agreed to new contracts for the public lighting of the remaining districts at prices considerably lower than those previously charged, but in no case at such low rates as those charged by the Brookline Company—the reduction being from an average of $1·53 to $1·18 per 1000 cubic feet. These contracts, as well as that with the Brockline Company, were voluntarily cancelled by the City in June, 1899, when an entirely new arrangement was entered into for the lighting of the city. A seven-year contract, with an option to the City

to renew for a further similar term, was then made with the Rising-Sun Lighting Company, who are not makers of gas. They undertake to furnish lanterns, Welsbach burners and mantles, keep the whole outfit in repair, light and extinguish the lamps, and provide them with gas—all of which they purchase from the Gas Companies. For these services the Company receive $30 per annum per light of 60-candle power, burning all night. The extraordinary contracts due to the cutting-out policy of the Brookline Company had, therefore, a life of barely six years.

At the time of the execution of the contracts just referred to, the Brookline Company were selling gas at $1·90 per 1000 cubic feet, which cost them $1·14 to manufacture and distribute, and were paying 7 per cent. dividend on share, and 5 per cent. on loan, capital. As the Company at once gave notice that they would reduce their price all round to the figure quoted for their Brighton district—namely, $1·50—and were, moreover, undertaking to supply gas elsewhere at $1 and less, there seemed little prospect of them maintaining their rate of dividend. The fact was, of course, that the prime object of the Company at this time was rather to hit the Bay State Companies than to pay dividends.

The Mayor, however, who was working in concert with the Brookline owners—the Standard Oil Company—immediately announced that the contracts entered into between the City and the Brookline Company afforded conclusive proof of the ability of all the Companies to supply gas at the same prices, and make a profit; and, within a few weeks, an order was, on his initiative, passed by the House of Representatives for a thorough investigation, by a Special Committee, into the history and relations of all the Bay State Companies. This Committee, who completed their work in about seven weeks, had power to compel the attendance of witnesses and the production of books and papers, and made a very thorough investigation; the report and evidence filling over 1000 pages. The majority report stated that, in the opinion of the Committee, the law had not been violated by any of the manœuvrings of the Bay State financiers, as, although the extra State capitalization of their Companies exceeded the value of the property by from $5,000,000 to $6,000,000, the dividends paid by the Boston Companies did not exceed 8 per cent. on the value of the property. The Committee were expressly ordered to report whether any of the Charters of the Companies in question ought to be revoked; and they reported against any such revocation. The legality of the $4,500,000 "obligation" issued by the Massachusetts Company was upheld in the majority report; but the minority urged that it should be annulled.

The immediate (but not very logical) consequence of the presentation of the reports was the passing of a measure revoking the Charter of the Bay State Company unless they should, within six months, cancel the "obligation" for $4,500,000, without incurring new obligations beyond the issue of such additional share capital as should bring up the total capitalization of the Company to the actual value of their property, as judicially determined. This value was found to be $2,000,000; and the Company accordingly were obliged to cancel the obligation for $4,500,000, and issue in its place only $1,500,000 of new shares—the original capital having been $500,000.

"Thus," says Mr. Gray, "ended this remarkable campaign against the Companies. The Mayor appeared to be successful at every point. Under his leadership the price of gas had been made lower than prevailed in any other large American city; public opinion had been created and directed; the policy of the State in regard to competing Gas Companies had been reversed; $3,000,000 of fictitious capitalization had been squeezed out of a great Corporation by legislative fiat; and the legislature . . . had resorted to the heroic remedy of undertaking to revoke the Charter of an active Corporation." The means by which these ends had been achieved were, however, that of actual competition between one Company and several others. Were the ultimate results as beneficial as the immediate ones appeared to be? That is the question which remains to be considered.

Of the total quantity of illuminating oil that was imported into the United Kingdom during the first six months of the present year, 57,304,420 gallons was American, 36,591,010 gallons Russian, 3,968,620 gallons Roumanian, and 158,440 gallons came from other countries; making a total of 98,022,490 gallons. Lubricating and other descriptions of oil brought up the total imports to 125,150,580 gallons. The total quantity imported during 1899 amounted to 236,260,653 gallons, of which 193,230,177 gallons were illuminating, 36,261,988 gallons lubricating, and 6,768,488 gallons other descriptions of oil.

At the acetylene works which supply the gas to the Hungarian street railway, chloride of lime was formerly employed as the purifying material. A mixture of chloride of lime and sodium plumbate containing an excess of alkali is now used. Chloride of lime alone is likely to cause explosions of the gas, on account of the liberation of chlorine. A purifier charged with the new mixture was opened after ten hours' working. When the upper grating, covered with lime, was removed, spontaneous combustion took place, and a long flame rose from the apparatus, but there was no explosion. Under these conditions, therefore, it may be said that the new mixture is not dangerous.

OBITUARY.

Mr. EDWARD MARFLEET, the Secretary of the Newport (Mon.) Gas Company, was found dead in bed last Thursday, at his residence at Llantarnam. Deceased, who was a bachelor, slept latterly in the house alone; and his housekeeper, who lives a few doors away, went every morning to call him and prepare his breakfast. She could get no response on Thursday morning; and on the door of the bedroom being forced, it was found that death had taken place some hours before. Deceased had been under medical care for some time for flatulence and spasm; but he was at business on Wednesday, and left at the usual time in the evening, apparently in his wonted health. Deceased, who was a native of Cambridge, was upwards of 60 years of age; and for the last 28 or 29 years had been Secretary to the Newport Gas Company, by the Directors and officials of which he was much esteemed for his kindliness and generous dealing. Deceased's hobby was rose-growing, in which he attained to a high pitch of skill and excellence; and the garden of his lodge is annually one of the sights of the district to the amateur rosarian.

PERSONAL.

At the first meeting of the new Council of the Society of Arts, Sir JOHN EVANS, K.C.B., F.R.S., was elected Chairman.

Herr FRIEDRICH SIEMENS, of Dresden, a brother of the late Herr Werner von Siemens, has been elected Honorary Doctor of Engineering by the Polytechnic Academy at Dresden, for his services in regard to cremation and technical inventions.

The Association of German Gas and Water Engineers have decided to dedicate a memorial to Dr. CARL AUER VON WELSBACH, who is an honorary member, in recognition of the services he has rendered to the gas industry by the invention of the incandescent gas-light.

Mr. R. C. SMITH has retired from the position of Chairman of the Devonport Gas Company, and has also resigned his seat on the Board. Mr. Smith has been a Director of the Company for 51 years, and its Chairman for more than 41 years. Mr. ALBERT BENNEE succeeds him in the chair, and Mr. A. W. WHITE has been appointed Deputy-Chairman.

Mr. F. W. TAYLOR, son of Mr. F. C. Taylor, Manager and Secretary of the Shanklin Gas Company, has been presented by the Directors with a case of drawing instruments, on his leaving the Company's service to become apprenticed to Messrs. E. Cockey and Sons, Limited, of Frome. The gift was accompanied by a letter to the recipient's father, in which the Directors expressed their pleasure at recognizing merit, and cordially wished "the young student engineer every success in the career of his choice."

The esteem felt by the employees and officials at the Tipton Gas-Works for their former Manager, Mr. VINCENT HUGHES, has recently been tangibly expressed by two presentations made to him before leaving to take up his duties at Smethwick. The gifts from the men consisted of an ebony walking-stick with ivory handle and gold mount, engraved with his initials, and a smoker's outfit. The officials, being desirous also of testifying their regard for Mrs. Hughes, selected an electro-plated tea service, on an oak tray bearing a suitably inscribed silver plate. Both gifts were accompanied with the best wishes of the donors; and they were acknowledged by Mr. Hughes in feeling language. He expressed the hope that the workmen would extend their unstinted efforts to his successor, Mr. H. O. Timmins, who, at the presentation made by the officers, was introduced to them.

NOTES.

Portland Cement.

It is remarked in the "Builder" that, although the use of portland cement in building is increasing enormously, many architects are still far from comprehending its nature and characteristics. For their guidance in this respect, our contemporary describes portland cement as a "tempered lime;" the word tempered in this case meaning the adjustment of its active or cementitious properties to a fixed point, to give a certain result. Portland cement of good quality consists of from 61 to 63 per cent. of lime. The most important of the other component parts are silica and alumina; their proportions having a certain effect on the speed of setting, while the lime gives the strength and soundness. There are so-called natural portland cements; but in these the proportions of the constituents, and consequently the value of the cement, vary greatly. The best materials for cement making are English chalk and the alluvial clay of the Medway estuary. The quality of the product is decided by the proportions in which these materials are mixed in the first place to form the "slurry," which is afterwards dried, burnt to a clinker, and ground. All these stages of the manufacture are susceptible of being conducted in different ways; and in particular the burning, for which coke used to be employed exclusively, is now receiving much attention with a view to economizing the fuel and enabling other kinds to be employed. The writer of the article strongly objects

to the addition to the cement of Kentish ragstone or other adulterant, and allows it to be inferred that, in his judgment, all existing methods of testing cement leave much to be desired.

A Report on Steel Rails.

A remarkable monument of fruitless cleverness and industry is the Blue-Book which has recently been issued, giving the report of the Committee appointed by the Board of Trade four years ago to inquire whether steel railway metals lose strength during long service. The question is of great interest to all engineers, most of whom entertain more or less of a conviction that steel does get fatigued, or altered for the worse with age and hard knocks, without being able to adduce valid proofs of the fact. The appointment of the Committee grew out of the St. Neot's railway accident of Dec. 10, 1895, when a couple of rails broke and wrecked the Scotch express. These rails had been in service from 1873; and apart from the circumstance that they had lost 10 lbs. in weight per yard, and therefore ought to have been removed from the main line, there was nothing apparently the matter with them. Chemical analysis revealed no striking peculiarity of composition. The metal was too hard—probably as an effect of continued cold rolling by the passing wheels. By the use of micro-photography, Sir W. C. Roberts-Austen discovered in parts of the broken rails patches of "martensite," the characteristic sign of steel hardened from a high temperature; but he was unable to explain the presence of this compound in the rail. Altogether, the report leaves the questions raised at the inquiry exactly where they were before. The investigation, lasting so long, and carried out by the ablest metallurgists and metallurgical chemists at the command of the Board of Trade, revealed nothing new of the slightest value in relation to the manufacture or the use of steel rails, or of any other variety of structural steel.

"Mond" Gas-Power Stations.

Discussing the engineering problems presented by British electrical power schemes, the "Engineer" finds a possible means of cheapening power production in the use of large gas-engines, like those made by the Cockerill Company, for working direct with blast-furnace gases, driven by the Mond variety of producer gas. It is hinted that a scheme of this character is actually being arranged. Powerful gas-engine plant, probably in 1000-horse power units, is to be put down in colliery districts; and electricity is to be generated at high tension for transmission to manufacturing centres. Mond gas, with recovery of the bye-products, is to be the fuel. This can be made from any grade of bituminous coal. There is a suspicion of amateurishness about this story in the incidental remark that "the gas produced may in a sense be regarded itself as being merely a bye-product." Of course, only that which is not the chief article of manufacture desired can be regarded as a bye-product; and in this scheme the gas is the chief thing wanted. It is estimated that, under favourable conditions of the coal and residuals markets, Mond gas can be made at a cost of 2d. per 1000 cubic feet. If it takes 100 cubic feet of such gas to yield 1-horse power, we have here the prospect of generating-horse power at a cost of 0·2d. for fuel. It is the opinion of the "Engineer" that, if such a result could be obtained regularly in practice, then the most economical steam-engines ever made would appear to be exceptionally wasteful machines. This hardly appears correct, in the comparative fuel costs alone; because the best steam-engine practice shows a consumption of about 15 lbs. of steam per horse-power-hour, which should be had for burning 2 lbs. of coal. In practice, however, steam power costs a good deal more, over a term of years, than appears from the results of short-time tests.

Professor Hull on Our Coal Reserves.—At the annual general meeting of the Victoria Institute, held at the rooms of the Society of Arts on Monday last week, under the presidency of Sir G. Gabriel Stokes, an address on "Our Coal Reserves at the Close of the Nineteenth Century" was delivered by Professor Edward Hull. The speaker said he had selected this subject for the annual address because public attention had recently been directed to the question of our coal reserves, chiefly owing to the increase in the price and to the unprecedented output of that mineral from British mines, amounting in 1899 to 220,085,000 tons, or about 18,000,000 tons excess over the previous year. Since the report of the Royal Commission on Coal, presided over by the late Duke of Argyll, had been issued in 1870, the coal production had doubled; and it was now a matter of anxiety to many as to how long a period our coal reserves would be able to bear the increasing drain. He strongly advocated the imposition of an export duty of at least 5s. per ton—to be paid at the port of export—on coal shipped to Continental States, which were taking from us about 40,000,000 tons annually, or nearly one-fifth of the total output. The proceeds of this duty would form a fund towards the relief of our increasing taxation. The best steam coal was of such primary importance to foreign countries that even with this duty there would be no lessening of the demand. He pointed out that, in the case of a European war, we should be in the position of having supplied our antagonists with a most important power of action against the ships of our own Navy. He suggested that there should be a new Commission on our coal resources, to investigate, among other things, the quantity of coal available for naval, commercial, and ordinary purposes, in the United Kingdom.

TECHNICAL RECORD.

THE ANNUAL MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY.

In the historic theatre of the Royal Institution, Albemarle Street, the members of the Society of Chemical Industry gathered last Wednesday for their annual meeting. Among the numerous throng were noticed scientists whose voices have been frequently heard in the building; and a few whose names are indelibly associated with it. In the person of the President, too, more than ordinary interest centred. Five years ago, a Section of the Society was formed in New York; and it has thrived until it ranks next to London in membership. With a desire to honour such a young but influential Section, the Society invited Professor Chandler, Ph.D., M.D., LL.D., of Columbia University, New York, to be their President during the current year; and he accepted the position, although, in the circumstances, it was one which entailed more than ordinary personal inconvenience. Professor Chandler's work in connection with the development of the study of the science of chemistry in America is alone monumental, and has gained him fame among chemists the world over. When he took the chair on Wednesday, his reception gave him, as he himself confessed, supreme gratification.

There was little of the formal business which first claimed attention in which readers of the "Journal" are concerned. Two or three points, however, in

The Report of the Council

may be noticed. The number of members on the register is now 3459, as compared with 3312 at the last annual meeting. During the past session, 81 papers appeared in the Society's "Journal," as compared with 89 last year. The expenditure for the year amounted to £5330; leaving a small deficit of £127. But there were exceptional charges amounting to about £760 in connection with the compiling and printing of a collective index. One paragraph stated that it had been felt for some time that it would tend to the advancement of applied chemistry if the Society were to encourage manufacturers to bring their problems and difficulties under the notice of men of skill and experience, such as may be found in works, technical laboratories, universities, and colleges. The Council accordingly announced that they were prepared to consider applications from manufacturers and industrial associations who desired to avail themselves of such assistance. The first to make application under this scheme was the Scottish Papermakers' Association, who offered prizes to the value of £100 for solutions of certain problems connected with their industry.

The President's Address—Technical Education, Water Gas, Incandescent Gas Mantles, and Other Topics.

The address which the President delivered after the transaction of the general business is encyclopædic in character. It traverses over something like sixty to seventy subjects, and administers to the tastes and interest of the chemist in nearly every branch of the profession. The address contains no scientific revelations, or record of purely personal investigation; but its value lies in the fact that it is an *exposé*, from the pen of a leader, of the exact present state of chemical knowledge and attainment of our American friends. Much, however, as the President had tried to compress his review, it covered such a vast expanse, that he could not do more than give a digest of what he had prepared. Nothing could have been more appropriate than that Dr. Chandler, occupying the eminent position he does, should devote the first portion of his address to the rise and progress of chemical and technical education in the United States. He relates how, when he started out in the autumn of 1853 to secure a chemical education, there were only three or four places in the United States which were available; and even in those, students soon found the want (at that time) of a systematic, organized course of study. This lack of means for organized study resulted in the early exodus of students to European schools, more especially in Germany, in which country the President himself sojourned for some three years in the quest for knowledge. Returning to America in 1856, he found interest was already increasing in the subject of chemical education, and that several universities and colleges were opening chemical laboratories for practical instruction. We have not space to follow Dr. Chandler closely in his account of the growth of chemical and technical education in the States. It may be mentioned, however, that in some incidental remarks he strongly advised the combination of chemical and engineering studies. Another point which should be known far and wide is that the President possesses a list of the sums of above $5000 that were given to the colleges, universities, and technical schools of the United States in 1899, and which total to the magnificent sum of $33,111,000. The President thinks he is safe in saying that they have now more than 100 schools of chemistry in the States. In all, there are 480 universities and colleges, and 43 technical schools. There are 89 schools or universities teaching some branch of engineering professionally; 63 of these have courses in civil engineering, 56 have courses in mechanical engineering, 49 have courses in electrical engineering, 30 have courses in

mining engineering, and 9 have courses in architecture. All the engineering courses include considerable instruction in chemistry, so much so in many cases as to qualify the graduates to fill positions as chemical engineers. Dr. Chandler has been informed by Professor Baker, President of the Society for the Encouragement of Engineering Education, that in 1899 there were 9784 students pursuing professional courses in the schools of engineering, and that 1487 graduated that year, receiving the degrees of civil engineer, mechanical engineer, electrical engineer, or mining engineer. No one can estimate the value to the industrial development of the United States of the education of such an army of thoroughly trained engineers and chemists. Passing from educational matters, the President gives some information regarding the chemical societies of America, which have already accomplished a great deal that has benefited and consolidated the profession in that country. It was in 1895 that the Council of the Society of Chemical Industry authorized the establishment of a New York Section; and already 738 members have been enrolled. The American Chemical Society, which was created in the seventies, numbers 1544 members.

Investigations in agricultural chemistry receive very full treatment by Dr. Chandler. It appears that the example set by Lawes and Gilbert in the noble work which they have accomplished at Rothamsted during the last half century has led to the establishment of agricultural experimental stations all over the States; and a large amount of original investigation in subjects more or less allied to agricultural and physiological chemistry has been accomplished at these stations, of which there are now 59. There are 148 chemists connected with them, all devoting their entire or chief attention to chemical work. One of the most important objects in view in establishing these stations was to protect the farmer from the cupidity of dealers in artificial fertilizers. Every fertilizer sold in the United States is now subject to careful chemical analysis; and the results are published in the bulletins issued from time to time by the stations. The amount of money which has been saved to the farmers by this work alone is incalculable.

In a section on sanitary chemistry, the President tells us, among other things, that within the last few years, the increase in population and the increase in manufacturing establishments has forced the subject of the pollution of streams upon the public mind. At present action is being taken in several States to compel cities, towns, and villages to purify their sewage before permitting it to be discharged into the streams; and there will be in the near future a demand for chemical and engineering skill to carry out the requirements of legislation in this direction. For similar reasons the purification of water supply is now attracting a great deal of attention; and systems of coagulation and filtration have been introduced which greatly simplify the problem. The addition of a fixed but small amount of alum to the water on its way to the filters, together with certain mechanical devices in connection with the filters themselves, has made it possible to filter the water supply of cities of any size with certainty and with great rapidity. The first large water purification plant in the United States was built at Poughkeepsie, N.Y., in 1872; and since that time the number of works built for the filtration of water has exceeded 175. Of water-filters there are at present 20 plants operating upon the English or slow system, supplying an aggregate of 260,000 people, and 154 mechanical filter plants, supplying an aggregate of 1,600,000 people. Water-filters are projected or under construction to supply the cities of Louisville, Cincinnati, and Pittsburg, with an aggregate of 700,000 inhabitants.

Under the heading of the chemical industries of the United States, Dr. Chandler presented a considerable amount of information as to the production of ores and minerals, and of metals and secondary mineral and chemical products. In the coal production, he states, there has been a large increase within the last year. Over 218,000,000 short tons have been produced, of which 191,500,000 tons were bituminous coal, 36,000 cannel, and 60,577,000 tons anthracite; and there are still most extensive tracts of coal lands which have not been disturbed by the miner's pick. The coke industry has also increased; 18,000,000 tons now being manufactured.

Liquefied gases and electro-chemistry find a place among the next few subjects; and in connection with the last-named, it is recorded that the calcium carbide industry continues to prosper in the United States. It is controlled by the Union Carbide Company, which operates two plants—the larger at Niagara Falls, the other at Marie, Michigan. In Canada two plants are also in operation—one at St. Catherine and a new one at Ottawa. Mr. James L. Willson, who was the pioneer in the manufacture of calcium carbide and acetylene, is interested in these Canadian plants. The output at Niagara for 1898 was from 8 to 10 tons a day, using 2500 electrical horse power. In 1899 the yield was increased to from 20 to 30 tons a day, with the use of 5000 electrical horse power. The present production of the Union Carbide Company is about 1000 tons a month. The continuous Horrey furnaces are in operation in the two plants; and the price now of the carbide in carload lots is $70 a ton. The carbide is guaranteed to yield 5 cubic feet of acetylene per pound. At St. Catherine, Canada, with the use of 1200 electrical horse power, the output is 1200 tons of carbide per year. The export price is $60 per ton in carload lots. Much of the product is sent to Germany, Japan, and South America. Owing to the fact that the carbide is classed with dangerous chemicals and explosives, the business is very much hampered by the high insurance rates and the high freights. Little progress has yet been made in the establishment of plants for lighting villages and towns with acetylene; but there seems to be a constantly increasing demand for it for isolated plants and other purposes.

In the succeeding section of the address is given a mass of information as to the oil production of the States; and then comes the most interesting part for gas engineers. It is headed "Water Gas," and reads as follows: Parallel with this development of cheap oil for burning in lamps, we have had corresponding improvements in the manufacture of illuminating gas. Prior to 1870, illuminating gas was manufactured in the United States exclusively from bituminous coals, largely from the caking coals from Nova Scotia and the Western States, enriched with cannel coal from Virginia or Pennsylvania, or with Albertite from Nova Scotia, Grahamite from West Virginia, Boghead coal from Scotland, or similar materials. The gas averaged about 16-candle power; and the price in New York City was $3·75 per 1000 cubic feet. The new departure in gas making began with the establishment of the Tessié du Motay process of making water gas in New York City. The subject of water gas was an old one, and had been discussed and experimented upon for fifty years more or less; but there were two or three difficulties in the way of its manufacture in Europe. The decomposition of steam by red-hot carbon was perfectly feasible with the production of a mixture of hydrogen and carbonic oxide; but there was no convenient economical method for imparting to this non-luminous gas the power of giving light. There was no material cheap enough for the purpose. The petroleum industry made this possible in the United States. We had an abundance of cheap petroleum naphtha, which could be obtained at from 3 to 5 cents per gallon; and 5 gallons per 1000 feet were sufficient to impart to the mixture of hydrogen and carbonic acid the necessary illuminating power. In the Tessié du Motay process, the non-luminous water gas was manufactured from steam and anthracite coal, and was stored in a gasholder. It was impregnated with naphtha by passing it through a carburetting machine which contained a large number of flat trays charged with naphtha. In order to fix this naphtha, and prevent its being condensed in the mains, the mixture of gas and naphtha vapour was passed through long gas-retorts maintained at a red heat, in order to crack up the naphtha and convert it into permanent gases. The product was then washed and purified in the usual way to remove tar and sulphur, &c. Great difficulty was at first experienced in regulating the temperature of the fixing-retorts, which were heated by external fires. If they were not hot enough, the naphtha was not cracked into permanent gases. If they were too hot, the rich light-giving gases were destroyed, and carbon was deposited in the retorts. A very ingenious device was hit upon by Mr. Bradley, the Superintendent, for regulating the temperature. He placed on the exit-pipe of each fixing-retort a small stopcock, and provided the foreman with pieces of paper lined off in squares corresponding to the number and position of the fixing-retorts. At regular intervals the stopcock was opened, and the gas from the fixing-retort, without being lighted, was allowed to impinge upon the proper square of the piece of paper. A spot was produced varying in colour from yellow, through different shades of brown to black. The medium shade was the proper one; and the foreman was expected to so regulate the fires in the benches as to secure the proper shade of colour on the testing-paper. This process of Tessié du Motay was afterwards introduced by the New York Gas Company on the east side of the city. As this water-gas process was controlled by patents, it was quite natural that the old Gas Company should be very much opposed to its introduction; and every effort was made to secure legislation from some authority to prevent it. The matter came before the Health Department of the city, of which I was at that time the President; and, after careful investigation, the Health Department decided that the gas was such an improvement in quality and price, and the increased danger from the gas over the old-fashioned gas was so slight, that it was not wise to interfere with it.

This gas resulted in reducing the price ultimately to about $1 per 1000 cubic feet, and the average quality is between 26 and 27 candle power. This in place of bituminous coal gas at $3·75 per 1000 feet, with an illuminating power of 16 to 17 candles. Appeals were made to the Board of Aldermen and to the Legislature to put a stop to the manufacture of water gas; but the consensus of opinion in the United States has been in favour of the new gas; and we do not believe that its use entails any great increase in the danger attending the use of any illuminating gas. It is true that it contains from 25 to 30 per cent. of carbonic oxide; while the old-fashioned gas contained from 7 to 13 per cent. It is also true that we have a certain number of deaths, accidental or suicidal, and perhaps occasionally criminal, from breathing illuminating gas—more, probably, than we had fifty years ago; but I think not many more than properly corresponds to the greatly increased use of gas, resulting from its cheapness and brilliancy. While the Tessié du Motay process did not extend beyond New York City, the water gas industry has taken almost complete possession of the entire country. There are thirty or forty different forms of apparatus for manufacturing it; but they are almost without exception applications of the invention of Thaddeus Lowe.

The Lowe process consists in employing a fixing-chamber,

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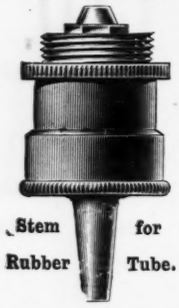

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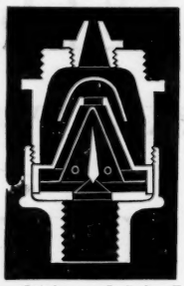

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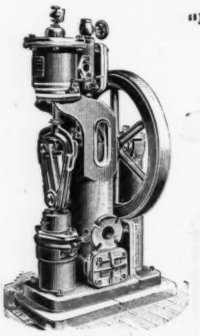


Fig. 705. "SINGLE RAM" STEAM-PUMP.

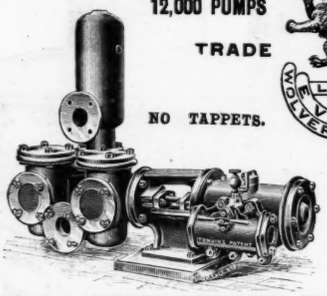


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

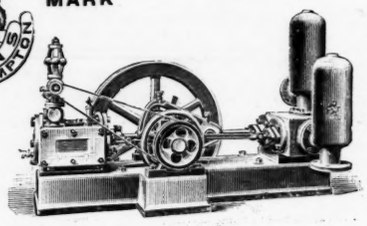


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

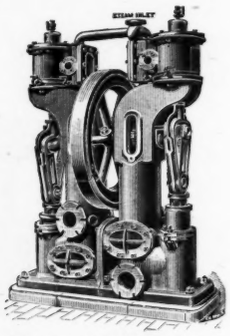


Fig. 713. "DOUBLE-RAM" STEAM-PUMP.

A NEEDFUL NOTICE

TO ALL WHOM IT MAY CONCERN.

We hereby intimate to Chairmen and Members of Gas Committees, Engineers and Managers of Gas-Works, that we have **PURCHASED THE BUSINESS AND PATENTS OF THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED,** Westminster, London, and are now the Sole Owners of the Patents of the pre-eminently successful system of Self-Acting Conveyors and Elevators in combination with the Storage Hoppers, the Measuring Chambers, and the Charging-Shoots, forming together the much admired and happily-designated "powder-pouch" method of charging Inclined Retorts, now in operation, or in course of erection, at—

Aberdeen,	**Cambridge,**	**Leeds,**	**Nine Elms,**
Batley,	**Chesterfield,**	**Leigh,**	**Rotherham**
Bow Common,	**Coventry,**	**Manchester,**	**Smethwick,**
Brentford,	**Dewsbury,**	**Middlesbrough,**	**Todmorden,**
Brighouse,	**Dudley,**	**Middleton,**	**Wakefield,**
Burnley,	**Gateshead,**	**Nelson,**	**West Hartlepool,**
Burslem,	**Huddersfield,**	**Newcastle,**	**Wolverhampton.**

PLEASE ADDRESS:

NEW CONVEYOR CO., LTD., SMETHWICK.

previously heated by internal combustion, in contradistinction to a fixing-chamber continually heated by an external fire. The Lowe apparatus consists of a generator filled with anthracite or coke, through which air is first blown to bring the fuel to a high state of incandescence. Air is admitted above the coal, to support the combustion of the generator gas in the adjacent fixing-chamber. At the end of a few minutes, the air-blast is turned off, steam is turned on, and the exit to the gasholder is opened. At the same time, there is injected above the mass of incandescent fuel the necessary quantity of either crude petroleum or some cheap petroleum product—such as gas oil or naphtha. This oil is immediately vaporized and mixed with the water gas. It then passes into the fixing-chamber, which may be either above or at the side of the generator. This fixing-chamber, having been previously heated by the combustion of the generator gas, is at a proper temperature for cracking and fixing the oils; and the finished illuminating gas is delivered from the apparatus.

In 1896 Mr. Walton Clarke made a careful inventory of gas companies in the United States, and found the processes in use divided as follows:—

Companies using coal gas (generally small)	418
Companies using water gas	296
Companies using water gas mixed with coal gas . . .	116
Companies using oil gas	108
Companies using miscellaneous processes	13
Total	951
Total using water gas	412

During 1897, 1898, and 1899, and the first five months of 1900, the United Gas Improvement Company erected or are now erecting 133 sets of water-gas apparatus. Of these, 11 are for new companies, and 23 are additions to original installations. It seems safe to say that there are at least 500 gas companies using water gas wholly or in part. It is estimated that there were sold in the United States in 1899 70,000 million cubic feet of gas, of which 75 per cent., or 52,500 million cubic feet, were carburetted water gas.

During the last year or two the price of petroleum products has advanced to such an extent that the manufacturers of water gas are beginning to question the possibility of continuing to supply water gas at current prices; and as the public would never consent to have the price of gas raised, they have been looking about for some substitute for the present process. The great improvements in late years in the coke-ovens designed to save the bye-products of bituminous coal—that is, the gas and ammonia—have made it possible to manufacture the old-fashioned bituminous coal gas at a much lower price than formerly; and it is quite probable that, if the high price of petroleum products continues, we may see a gradual abandonment of the water-gas industry and a return to the old-fashioned coal gas. This change has been already accomplished for the city of Boston. There has been erected at Everitt, near Boston, large works for supplying the city.

I am informed that, at the Everitt works, the coke-ovens of G. Hoffman are employed, and that 400 of them are now in use. These retorts are rectangular, about 60 feet long. They are provided with Siemens regenerative furnaces. Each retort is charged with 6 tons of bituminous coal from Cape Breton, Nova Scotia, which can be delivered in Boston for less than $2 a ton. The process of coking begins with generator gas from a special furnace. The combustion takes place in a series of flues which pass around and through the retorts. When the temperature reaches a red heat, a portion of the gas generated from the coal is switched into the furnaces, and the coking is continued with this material. I understand that from 30 to 50 per cent. of the gas produced is employed in heating the retorts. About 2400 tons of coal are coked daily; and the coke is employed in the locomotives of the Boston and Maine Railroad. The tar and ammonia water are collected; and it is estimated that 12,000 tons of sulphate of ammonia will be produced per annum at these works, and a corresponding quantity of coal tar. The Solvay Alkali Company of Syracuse has also established a large coking plant, primarily to secure ammonia for its alkali process. The retorts employed are shorter than those in use at Everitt, having a capacity of 4½ tons of coal.

The President next speaks as follows on the subject of incandescent mantles: The efficiency of gas lighting has been wonderfully increased by the introduction of the incandescent mantle invented by Auer von Welsbach. By the use of this beautiful device, the light-giving power of gas has been increased enormously. Water gas, which in the old-fashioned burners of the best kind yielded an illuminating power of 5 candles per foot of gas consumed, yields with the Welsbach mantle from 15 to 20 candle power, and with the improved mantles now being manufactured by the Welsbach Company at Gloucester, nearly 25 candles per cubic foot of gas consumed. I had occasion recently to test one of the new mantles taken from the regular stock; and with a consumption of 5 feet of gas, I obtained 122·5-candle power, or 24·5-candle power per foot of gas consumed. This great increase in the light produced by the incandescent mantle is due to Welsbach's latest discovery of the fact that the greatest amount of light can be obtained when the mantle consists of from 98 to 99 per cent. of thoria, which by itself emits little light, but has the advantage of making the toughest and most durable mantle, and from 1 to 2 per cent. of ceria, which in combination with the thoria exhibits the greatest light-giving power. The introduction of thoria and ceria into the affairs of everyday life is a very striking illustration of the advance of modern chemistry. In my student days, ceria, and particularly thoria, were regarded as extremely rare earths; and I remember that Professor Woehler placed in my hands, in 1854, a few grammes of thorite from Sweden, from which I prepared thoria.

When Welsbach began his experiments upon thoria, it seemed impossible to procure anywhere in the world a sufficient supply of this material so as to make it available for use in the arts. But as soon as a demand was created, Nature responded; and vast quantities of monazite, containing 5 or 6 per cent. of thoria, and much larger quantities of ceria, were discovered, first in the mountain streams of North Carolina, and later in the seashore sands of Brazil. There is every reason to suppose, therefore, that these and other localities will supply all the thoria that may be needed for the manufacture of these mantles. I visited the works of the Welsbach Company recently; and my friend Waldron Shapleigh, the Chemist of the Company, who has worked up the methods for extracting chemically pure thoria from the monazite, showed me through the works. It was interesting to see streams of monazite running into the digesters in charges of half a ton each for the extraction of the thoria and ceria. I also saw hundreds of tons of the bye-products, consisting of the salts of cerium, lanthanum, neodymium, and praseodymium, stored up in the hope that sooner or later some use will be found for them in the arts or in medicine.

The latest novelty in incandescent mantle lighting is the new Welsbach student lamp, which burns gasoline of 74° Baumé under a Welsbach mantle. The amount of light produced is incredible; it almost equals a moderate sized arc light. The lamps are made portable and stationary. It seems incredible that anyone should be willing to bring 74° gasoline into his dwelling-house; but I am told that in the West this new lamp is meeting with great success. It is really astonishing how reckless people are with regard to the use of inflammable oils. Gasoline cooking-stoves, particularly for summer use in country houses, are meeting with considerable success.

An address of this varied character from an American scientist would have been incomplete without a reference to natural gas. On this subject the President says that the supplies continue to decline in quantity and pressure. Occasionally new territory is opened, and supplies are obtained but never in sufficient quantity to maintain the pressure. There is a gradual falling off in the yield; and it is evident that the supply of natural gas will be sooner or later practically exhausted. The value of the gas obtained in 1898 was $15,296,000, of which nearly $7,000,000 came from Pennsylvania, $5,000,000 from Indiana, $1,500,000 from Ohio, and 1½ millions from West Virginia. New York supplied only $229,000 worth. Next in order came Kansas, Kentucky, California, Utah, Colorado, Illinois, and other States.

For his address, Dr. Chandler was very heartily thanked on the proposition of the President-Elect, Mr. J. W. Swan, of electrical fame.

Miscellaneous Matters.

Interesting presentations followed. The Society's Medal was awarded to Dr. Edward Schunck, F.R.S., for his researches in connection with technical chemistry; and the President and ex-President (Mr. George Beilby), who has acted as Deputy-President during the year, were handed beautiful albums as souvenirs of their exceptionally interesting terms of office.

This concluded the technical and formal business of the meeting; and the remainder of the week was spent in pleasure. There was a luncheon at the Criterion on Wednesday, by invitation of the London Section; and the annual dinner took place in the evening at the Hotel Cecil. Visits to works, a reception by the Lord Mayor, and an excursion to Oxford, formed prominent items in the programme. On Saturday, a considerable number of the members left London for Paris, where arrangements had been made for a reception by the President on Sunday evening.

THE FILTRATION OF WATER FOR PUBLIC USE.

In the "Journal" for July 10, a general notice was given of the proceedings at the annual convention of the American Society of Civil Engineers, held the previous week at the Institution of Civil Engineers, Great George Street. One of the subjects considered was the filtration of public water supplies; and we now give a *résumé* of the very full discussion which took place.

Mr. Rudolph Hering (New York) introduced the question. In his early remarks, he claimed that America had contributed much to the elevation of the practice of filtration from an empirical to a scientific basis. Coming to the methods now practised, he said they were substantially divided into two classes. One required a large bed of fine sand, through which the water was allowed to percolate at the rate of, roughly, 5 to 10 cubic feet per day per square foot of filter surface, or a column 2½ to 5 inches in depth per hour. The other, with a much smaller bed of sand or similar material, required from (say) 200 to 400 cubic feet per day to pass through one square foot of filter surface, or a column of water of from 8 to 16 feet in

depth per hour, which was, on the average, a rate some forty times faster than in the first case. As the chief difference was this rate of speed, the two systems had been called respectively slow and rapid filtration, and the appliances sand and mechanical filters. The efficiency of the slow or sand filters depended upon a number of conditions, the most important of which were: (1) The size of the sand grains. It was found that fine sand of uniform size, and several feet in depth, gave the best results. It was further found that the number of bacteria in the effluent water increased with a decreasing thickness of sand bed, and with an increasing size of sand grains. (2) The rate of filtration. A rate of from 2 to 3 million (U.S.) gallons per acre per day, or a column of water about 3 to 4½ inches in depth per hour, was found most satisfactory as a rule. The number of bacteria passing through the filter increased rapidly with the rate of filtration, which should in any case be kept uniform to get the best results, and to accomplish which the use of controlling devices was required. (3) The free withdrawal of the water from the under-drains, to secure the same rate in all parts of the filter. (4) The temperature of the water should not vary greatly, since it controlled the pressure required to effect a given rate of filtration, and as the bacterial efficiency decreased with the temperature. (5) The age of the filter-bed. New or freshly scraped filter-beds gave a higher number of bacteria in the effluent water than old and well-compacted sand layers. The slow method of filtration had been practised according to two methods—the continuous and intermittent. When the amount of dissolved oxygen contained in the water was sufficient for the necessary bacterial action, the continuous method was preferable, because it was simpler and cheaper. When the water was highly polluted—requiring a large amount of oxygen for the proper bacterial action—the intermittent system might be preferable. Or when the water was highly polluted, a double continuous filtration might be practised, as in several cities of Holland. Still another variation was practised in Altona, where the first filtrate coming from the filter just after it had been cleaned, and therefore generally not sufficiently pure, was passed through another one that had not been recently cleaned, before it entered the city's mains. In climates where water froze frequently during the winter, and to a depth of at least several inches, it was customary to cover the filters, in order to obtain the best results. Where it was impracticable to do so, as was the case in Hamburg, special allowance had to be made for decreased bacterial activity in the colder water, as well as for mechanical difficulties resulting from the ice. When the water to be filtered had a high degree of turbidity, economy demanded that it be allowed to deposit most of its suspended matter before it was run upon the filters. Settling-basins were therefore a necessary adjunct to almost all filters for river water. When this contained finely divided clay, the filter might allow the water to pass through without giving it a thorough clarification. One day's settling was usually sufficient for the purpose, as by far the largest proportion of suspended matter, and all the coarser matter, was removed within that period. While the custom to provide one day's settling prevailed in America and Germany, it had been preferred in England to build storage reservoirs sufficient in size to hold water for a much longer period. Rapid or mechanical filters were first introduced in America. They acted on the principle of straining, by which the suspended matter and the bacteria were kept substantially on the surface of the filter material. The rapid rate of the passing water did not allow of much organic action below the surface, and required also a rather coarse filtering material. In order to keep back the fine matter held in suspension—such as clay particles and bacteria—coagulating substances were added to the water in definite quantities, depending chiefly upon the amount of lime and organic matter contained in the raw water. The resulting flocculent matter settled upon the surface of the filter-bed, and then acted chiefly as a strainer sufficiently fine to hold back the minute particles, including a percentage of bacteria which, under favourable conditions, might be as large as that removed by the slow filters. The conditions for a successful operation of such filters were now much better understood than formerly. It was possible now to arrange their operation so that, from a water of a given quality, fairly definite results could be obtained. The efficiency depended mainly on the size and character of the grains, upon the rate of filtration, the constancy of this rate, the proper admixture of the necessary coagulants varying with the quality of the water, and upon the arrangements for properly withdrawing the filtered water. Two kinds of rapid or mechanical filters had been used—those acting under the slight pressure of the water contained in an open filter, and those acting under a high pressure in a closed filter. Although in many cases convenient and economical, the high-pressure filter could not give equally good bacterial results, because the delicate film of coagulants was easily ruptured. High-pressure filters should therefore only be used for waters not seriously polluted. From this review of the characteristics of the two principal methods of filtration now in use, it would be gathered, said Mr. Hering, that both might satisfactorily purify water under ordinary conditions. The criteria which should guide the selection of one or the other method for a particular case were their relative sanitary effect under expected conditions, the reliability of their operation, and their cost. As to reliability of operation, it seemed to him (Mr. Hering) that the slow filters should be given the preference; and regarding cost, it had been found that often the two methods were about equally expensive. The required investment was usually greater for slow filters; but the cost of operation was correspondingly less, and *vice versâ*. They might therefore expect that both the slow and rapid filters would be used in the future with good results in their respective spheres.

Mr. W. H. LINDLEY then gave an elaborate description of the water purification plant at Warsaw. The water was taken from the River Vistula, which contained an average in the year of between 3000 and 4000 bacteria per cubic centimetre. It was necessary to adopt a system of intense settling, if he might so call it—that was, the settling had to be carried out as rapidly as possible. For this purpose, the settling-tanks had been constructed on a different system from that usually adopted—that was to say, they had large tanks into which the water flowed at at one end and out at the other. The tanks, which were divided by longitudinal walls into narrow chambers were about 80 yards long. By the aid of diagrams, he explained their internal construction, and showed that they were fully occupied and utilized both horizontally and vertically. The velocity of the water in the tanks was about 1 mm. per second. Owing to the Russian climate, the tanks were all vaulted—in fact, they were the first vaulted settling-tanks on a large scale that had been carried out. They were designed to deal with 22 to 30 million gallons per day; and only one-half of this capacity was at present utilized. The filters, on to which the water passed from the tanks, were likewise vaulted. They contained 2 feet of sand and 2 feet of gravel, carefully increasing in coarseness downwards. They were on the principle of slow filtration; about 4 inches per hour being the maximum rate. It was considered necessary to regulate each filter according to its condition; and for this purpose an automatic apparatus had been constructed, by means of which perfect regularity was ensured. Mr. Lindley next spoke of the importance of distributing the water equally on the filter surfaces, and said the manner in which they avoided a greater head on one part of the filter than the other had been obtained by making the drains of very large section. About the time these filters were put down, the bacteriological question was raised; and one interesting fact was at once elicited at Warsaw—that the number of bacteria bore more or less direct relation to the velocity of the filtration, and inverse ratio to the thickness of the sand. In their new filters, they had reduced the thickness of gravel to 6 inches and 1 foot, and increased the thickness of the sand to 4 feet. Allowing for the scraping off of 1 foot, the minimum thickness obtained was 3 feet, against 1 foot formerly. Corners were a weak point in filters; and in the new ones, they had been done away with. The air-outlets had been combined with the drains, which were very large—2 feet wide and 2 feet high. A special system of ventilation had also been arranged from the water-level. Ventilating-shafts, about 10 feet high, had been raised; and very active ventilation went on. As to the results of the working during the four years 1895-8, they had four settling-tanks, the total contents being 47,000 cubic metres. The average quantity of water pumped was 43,000 cubic metres, the maximum 58,000 cubic metres, and the minimum 31,000 cubic metres. So the average duration of settling was 25 hours. The suspended matter deposited in the settling-tanks varied from 79·9 to 82 per cent.—that was, 80 per cent. of all the suspended matter was retained by the settling-tanks. The matter retained by the filters was 20 per cent. These were important figures to be considered relatively to the cost. The cost of clarifying the water by settling, in spite of these rather expensive works (which had to be constructed on account of the climate of Warsaw), was one-fifth of that by filtration. The water was not what would be exactly called a good water. It contained 3480 and 3800 bacteria per cubic centimetre. After settling, this was diminished to 3000 and 2600; and, after filtration, it averaged 40, 70, 81, and 41 germs per cubic centimetre. In other words, the average proportion of bacteria retained by the filters was 98, 97, 97·4, and 98·5 per cent. The rate of filtration was small—viz., 4 inches per hour.

Mr. G. F. DEACON paid a tribute of admiration to the way in which American engineers have recently taken up the subject of water purification. In regard to sand filtration, there was one element which was not completely settled, and that was the part that the sand itself really played in the process. This they did know, that the sand was not much more than a strainer, that it served to support the film which was formed on its surface, and which really constituted the filtering medium. Nevertheless, they could not do without a considerable thickness of sand, because the film was exceedingly thin, and was subject to rupture from many causes. He had found in a great number of filter-beds, made in the old style with a considerable thickness of sand—say, 4 feet—that, unless the sand had in it elements such as lime or iron, which tended to a certain extent to its cohesion, or unless the particles of that sand were exceedingly uniform in size, the moment filtration started, a movement of these particles began. In such filter beds, by cutting down to a vertical surface, they would find a lenticular formation of the redisposed grains—coarser grains and finer grains, and a certain amount of pitting in lenticular and angular forms. He had come to the conclusion that, instead of the water going down vertically as one felt disposed to think it would, it did nothing of the kind. It was just as erratic as a piece of paper let fall from the hand and passing through the air, and the velocities were very much greater in the sand than was generally supposed.

Following up this observation, he had found that effect upon a surface just over a place where the larger grains were left, and from which smaller grains had been washed; and he believed this phenomenon was more readily created in a thin bed of sand than in a thick one. Referring to Mr. Lindley's remarks, he stated that in recent practice in this country automatic regulation had been adopted, but the flow was not made uniform under all circumstances—it depended upon the condition of the filter. In addition, he (Mr. Deacon) now measured the flow on a diagram; and this he considered was a great safeguard—giving as it did a sudden indication of a condition which could pass bacterial life.

Mr. G. W. Fuller (New York) thought that, in considering the various systems of filtration, the quality and composition of the water to be filtered was a factor of prime importance; and this was particularly so in America, where they had wide ranges in the character of surface waters. There the question of the appearance of the filtered water was one of the most unsettled conditions that water engineers had to face, because there were no other means by which the consumer could form an opinion of the water than by the colour it possessed. The speaker proceeded to supply a vast amount of information regarding the types of waters with which American engineers had to work, and which showed that they were of a character very difficult to deal with in regard to their purification. He commented on the meagreness of analytical evidence concerning these waters, and especially with respect to samples which represented normal and maximum conditions, and which the engineer must consider in designing his purification works. He also complained that there was a lack of uniformity in the analytical methods that were used to obtain the results. An effort to correct this was being made by the American Public Health Association. The English system of sand filtration was regarded most highly in America. But they had little information to guide them as to the practical operation of any kind of filters; being dependent upon results of investigation carried on on a small scale. There were really not more than twelve or fifteen sand filters worthy of the name in America. There water purification was really in its infancy; and it had not developed to the point to which they hoped to attain in a few years. Mechanical, or rapid, filtration was the method which had been used in comparatively small plants during the last twelve or fifteen years. It was a proprietary device, of which the patent expired next year. Its introduction had been slow, beginning with the purification of industrial water for the removal of vegetable stain and turbidity. For waters comparatively free from turbidity, American engineers were practically unanimous as to the English system of sand filtration being preferable. Their practice was to have a very thin layer of gravel under the sand—viz., 6 inches, and over the collecting-pipes 12 inches. The almost universal custom was to provide for the filtration of 3 million gallons of water per acre per 24 hours. But during extremely warm and cold weather, the consumption ranged from 40 to 50 per cent. above the average; and then the rate of filtration would be increased to 4½ or perhaps 5 million gallons per acre. Changes of this kind were made in a progressive and careful manner. He thought covers would be used in America in the majority of cases where sand filters were adopted, and gave his reasons for this opinion. There were many waters in America containing so much stain that sand filters were not applicable; and in these cases rapid filters and the use of a coagulant were found preferable.

Dr. S. Rideal pointed out that the American engineers had given sand filtration a trial; and it seemed only fair that English engineers should return the compliment, and give mechanical filters a proper trial here. It appeared to him that the upland surface and moorland waters would be very amenable to this mechanical filtration. Mechanical filters in which a coagulant was added would also, he felt sure, correct the fault of plumbism. On the whole, the method of sand filtration gave better bacterial purity than mechanical filters; but he took it this was only due to the fact that mechanical filters had been worked at a much greater rate, and perhaps with a minimum quantity of coagulant for the specific purpose for which they had been required in the States, without due regard to the reduction of bacteria. Although sand filters had been brought to a high state of perfection, there was still an odd balance of organisms passing through them; and these might be pathogenic organisms. He believed the question of the sterilizing of water would be brought forward very shortly for the reduction of bacterial impurity. He believed this could only be effected by "heat sterilization." He knew he was using the wrong phrase, but he did so purposely. It was not a question of heat sterilization at all; but what he meant was the temperature condition at which organisms were killed. He thought it would be well if the engineers of this country and of the States paid some attention to the problem of bringing very small bodies of water—2 or 3 pints per head of the population—to a temperature that would ensure the killing of any pathogenic organisms they contained.

Mr. Henry Davey (Birmingham) emphasized the importance of sedimentation in regard to the improvement of the quality of water, and the reduction of work on the filters. As had been pointed out, it was only the thin layer on the surface of the filter that did the work; and the object of this was primarily to maintain the thin structure in a quiescent state, so that the bacteriological effects might take place. As to the rate of filtration, according to his experience 4 inches per hour was good practice, and should be the maximum with a water containing a large amount of bacteria. Good management of filter-beds he referred to as a necessity. As to the thickness of sand, although a thin layer was all that was necessary to maintain the surface film, a considerable thickness was desirable for safety. If they took a section of a filter-bed having (say) a depth of 4 feet of sand, they would find streaks of pollution almost all through it. A point in a filter which gave considerable trouble was the inlet. If it were not properly constructed, the water around the inlet disturbed the sand; and the water found its way down without a surface film being formed.

Dr. Ad. Kemna (Antwerp) considered that the most important part of the work of a sand filter was the biological one; and it seemed to be true that the organic matters in the water were destroyed by fermentation. Colour matter was not dealt with by sand filtration; and the explanation was a very simple one. Animal or nitrogenous organic matter was an unstable compound, and very easily destroyed; while organic carbonaceous vegetable compound was much more troublesome to deal with. Therefore the fermentation that went on on the surface of a sand filter destroyed the one, but did not touch the other. He alluded to the importance and usefulness of a microscopical examination of the upper layer of sand filters. The sand filter was really a simple appliance; but Mr. Lindley had placed before them a very complicated arrangement for subsidence and an automatic regulating apparatus for filters. Mr. Deacon had pointed out that the latter was insufficient; and Dr. Rideal said that, while sand filtration did very well, he wanted to kill the odd microbe that was left in the water. If they took all these processes together, they would get a long list of appliances. There were practical limits to which they as water engineers could go; and he should suggest that these proposals required a certain amount of modification. Mr. Lindley's arrangements for subsidence were good for working on the continuous system; but, in his (Dr. Kemna's) opinion, subsidence was much better performed if they could give the water complete rest. Speaking of the thickness of sand, he thought there was some physical action behind the mere extraction on the surface of some of the soft matter in the water. Sand was an inactive substance; so that the value of an increase in its thickness did not lay in that direction. But there was a mechanical reason—that, with a thick bed of sand, the rush of water was diminished, and so, in the event of the film being ruptured, there would not be such a great rush of polluted water through it. He regarded the measurement of the rate of filtration as absolutely necessary.

Professor Hildyard supplied some particulars of the sand filtering arrangements for the city of Zurich, which was supplied with water from Lake Zurich. Owing to the character of the water, the filters used to require frequent cleansing; but, by the adoption of primary filters, the final ones ran for much longer periods. The primary filters were cleaned by a current of air, which was mixed with the water and pressed through the filter-beds. The rate of filtration was 7 metres per 24 hours; and the supply varied between 6 and 7 million gallons per day. There were ten filtering chambers altogether.

Mr. Walter Hunter (Grand Junction Water Company), referring to Dr. Rideal's remarks as to sterilization, admitted that engineers owed a good deal to chemists and bacteriologists who set up an ideal to which they (the engineers) strove to attain; but he thought the bacteriologists strained beyond what it was possible to attain in practice, and beyond that which was really desirable. The wonderful statistics regarding the health of the people and the death-rate in London, testified to the admirable way in which the filtration of the water supply was carried out. The Thames had been greatly improved by the action of the Thames Conservancy; and it was now 33 per cent. better than it was. By filtration, the Companies removed 98 or 99 per cent. of the microbes; and the chemical analyses of Sir William Crookes, Professor Dewar, and Dr. Thorpe were most satisfactory. Dr. Thorpe had dropped the microbial examination of the late Sir Edward Frankland, and confined himself entirely to the chemical analysis of the water.

Mr. Andrew Johnston (London) gave some results of experiments with polarite, in comparison with sand filtration; and he claimed for the former that it did at least 500 per cent. more work than the latter. The greater work that polarite could perform, in comparison with sand, more than counterbalanced its greater cost. He explained that polarite was an oxide of iron. It was treated in retorts; and the carbonic acid gas was driven out. The material was of a highly porous nature.

This concluded the discussion, which had occupied a considerable length of time.

A congress will be held at Aberdeen from the 2nd till the 7th prox., under the auspices of the Royal Institute of Public Health. Among the papers promised is one on "Sewage," by Professor Percy F. Frankland, F.R.S. The Council of the Sanitary Institute have arranged to hold a meeting in Paris from the 7th to the 9th prox., which will immediately precede the meeting of the International Congress of Hygiene and Demography, also to be held in the French capital. The Société Française d'Hygiène have offered to the members of the Institute a cordial reception, and are providing a reception-room, and making arrangements for special visits and excursions for the benefit of the members attending.

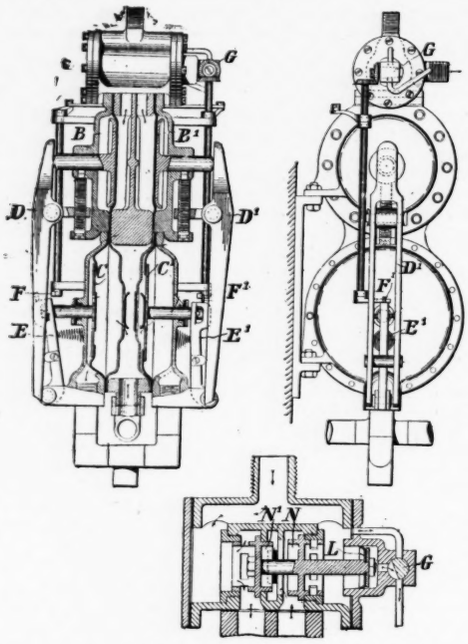
REGISTER OF PATENTS.

Compressing Gas.—Snell, C. G., & F. A., of Saltash. No. 12,921; June 21, 1899.

This invention relates more especially to appliances adapted for increasing the pressure of gas for incandescent gas lighting.

It will be seen that the frame used has two faces, each recessed to accommodate a gas diaphragm and a water diaphragm, so that the pulsation or motion derived from the latter (B B^1) is conveyed to the former (C C^1) through rocking-levers D D^1 and E E^1 oscillating on knife edges or centres.

Extensions of the levers actuate the controlling valve (see the enlarged section) at the head of the machine—striking at the end of each stroke, the arms F F^1 alternately. These are connected by other arms and rocking-bars to each other and to a tap G, the actuation of which allows the fluid to operate the valve.



While the gas diaphragm C is being driven in by the water pressure on the diaphragm B, the water is entering through the corresponding port; its exhaust-outlet being closed. Water is meantime being expelled from the other water division by the power of a spring; the exhaust aperture being open, and the water-inlet closed in that case. This latter division remains inoperative until the full stroke of the first division nearing completion causes the tap G to be reversed. The pressure is thereby admitted to the head of the piston L; and the valve therefore reverses itself on account of the extra area of the disc N over that of the disc N^1. The valve is so proportioned that, in reversing, it opens the water supply to one division before closing the other—ensuring continuity of water-feed.

Purifying Hydrocarbon Gases.—Exley, J. H., of Huddersfield. No. 15,239; July 25, 1899.

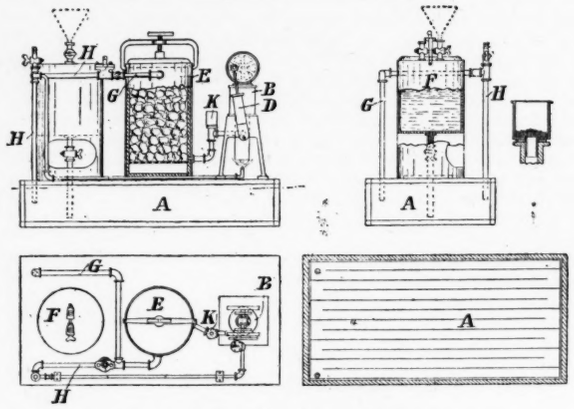
The patentee proposes to filter hydrocarbon gases by causing them to pass through "a porous earthenware body formed by burning in a kiln or otherwise an intimate or kneaded mixture of a suitable earth (such as porcelain or common clay, steatite, or the like) and granulated or sub-divided combustible material; such mixture being moulded into any desired shape for use." The porous earthenware body is made of a mixture of finely divided sawdust, bran, flour, or other combustible material with porcelain, common clay, steatite, or other suitable earth—the mixture, when subjected to the action of burning in a kiln, having "the effect of destroying to a more or less extent the combustible material that has been intimately mixed with the earth as described."

A porous body, made as above, serves, the inventor remarks, as a very efficient filtering medium for breaking up and removing impurities—such as coal tar, benzene vapours, and other impurities from coal gas, acetylene, and other hydrocarbon gases—and thereby reducing the tendency of such gas to burn with a smoky flame in an ordinary burner; and, on account of its absorbent nature, it also serves to effectually remove any moisture there may be in the gas. It is, therefore, especially suitable for filtering acetylene from any suspended solid matter carried away from the calcium carbide, and also moisture due to contact of the gas with the water used to decompose the carbide.

As a further medium for the purification and drying of acetylene or other hydrocarbon gases, the porous earthenware may be saturated with sulphuric, hydrochloric, or other suitable acids, so that the gas, in forcing its way through the porous material, is split into numerous streams, and thus brought into intimate contact with the acid, "which not only absorbs the ammonia and moisture, but a large proportion of other impurities which may be present."

Production of Illuminating Gas.—Schwander, F., of Durlach, Germany. No. 16,147; Aug. 8, 1899.

This invention relates to a method of producing a combustible gaseous mixture by passing moist air over calcium carbide, and then carburetting the resultant mixture of acetylene and air by passing it over petroleum-ether or other volatile hydrocarbon. It is chiefly based on the observed fact that the natural amount of moisture in the air is sufficient to cause the generation of acetylene if the air is conducted through, or over, a large quantity of carbide; the necessity of moistening the air before passing it through the carbide container arising only if the air be extremely dry. The process, it is said, offers (when compared with known methods) the following advantages: (1) Complete consumption of the carbide, coupled with the best results as regards the production of acetylene; 1 kilo. of carbide producing nearly 330 litres of acetylene. (2) Generation of the gas in a regular manner, and completely devoid of the danger consequent on the after-generation of acetylene gas within the carbide container. (3) The obtaining of a residue in the container in the form of a fine, dry, and dust-like powder of lime, which may be employed for many technical purposes, instead of a useless sediment or mud as hitherto.



D is a pump operated by a hot-air motor B, and drawing in air through a non-return valve beneath the cup K, which preferably contains shot, which, by being kept wet, would serve to moisten the air (in case the latter is too dry) before it passes into the carbide container E. The acetylene, as generated, flows through the pipe G, and is discharged into the carburetter A. This carburetting apparatus consists of an air-tight casing, in which pieces of felt are suspended with their bottom extremities dipping into a stratum of petroleum-ether or the like. The pieces of felt are so arranged as to alternately leave a space between the wall of the casing and themselves, so that the gas is compelled to follow a zig-zag course in passing through the casing. The petroleum-ether is supplied to the carburetter A through a pipe which dips slightly into the ether at its lower extremity, and is connected at the top with a reservoir F which, when once filled, can be closed air-tight. A cock is provided for the regulation of the direct supply of the crude gas to the service-pipe, by means of which the operator is enabled to introduce more or less of the crude gas (that is, the mixture of acetylene gas with air before being carburetted) into the mixture of gas passing into the service-pipe.

The apparatus is worked in the following manner: First, the hot-air motor is started; and as soon as the generation of acetylene begins (which occurs after a few minutes), the gas for feeding the flame of the hot-air motor, being produced by the apparatus itself, may be allowed to pass to the motor flame by way of the branch-pipe, whereupon the entire process proceeds automatically.

Gas-Meters.—Leckband, T. H. J., of Adair, U.S.A. No. 4739; March 13, 1900.

This "measuring machine for gas" consists of a pair of telescoping holders, each provided with a suitable service-pipe and sleeves, and connected to each other and with the burners. Depending sleeves in connection with the service-pipes, a pair of pivoted levers each carrying a sealing cup designed to co-operate with the sleeves, and suitable means intermediate of the levers designed to utilize the downward movement of each bell, complete the arrangement.

Production of Combustible Gas from Refuse Sweepings, Waste Products, and the like, Free from Carbon Monoxide, and with or without the Simultaneous Production of Cyanogen Compounds.—Imray, O.; a communication from G. Ottermann and Co. and Professor Victor Loos, of Vienna. No. 6625; April 9, 1900.

In their specification, the patentees point out that a process has already been proposed for the production of combustible gas free from carbon monoxide from refuse and waste products, by using retorts the walls of which contain iron, and are permeable to carbon monoxide. According to this invention, a combustible gas free from carbon monoxide (suitable for lighting and heating) can also be produced from refuse and waste materials when using fire-clay retorts that are impervious to gases.

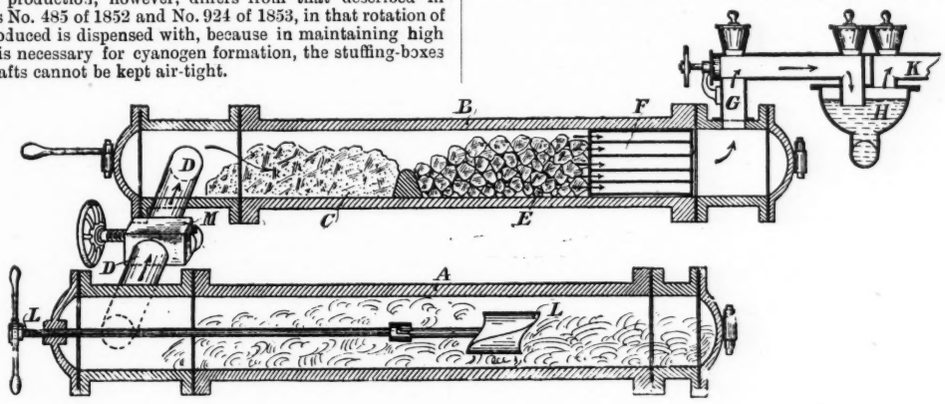
The process for this purpose is carried out as follows: (1) The gaseous mixture obtained by heating the refuse in a fire clay retort is led into a second retort, in which are contained suitable reagents arranged in a particular manner. (2) Both the generation of the gas and also its conversion in the second retort are effected at a temperature which (owing to the short duration of the gas production—namely, 1½ hours) is higher than that employed for illuminating gas. The inside of the retorts is maintained as uniformly as possible at a temperature of from 700° to 800° C. (3) The gases and vapours generated from the refuse in the first retort are caused in the second retort—in which the conversion of the gases is to be effected—to pass over hot paper ashes, so as to be raised thereby to the dissociation temperature; and they are then led, in a completely or partially dissociated condition, over coke or other carbonaceous material. By this means, the conversion of the gases is effected.

In order to procure the conversion of the gases obtained by distillation, they were first led over some heated substance having no chemical action—such as pieces of fire-clay—or over coke. The conditions of the present invention, on the other hand, consist in the combination of the use of the

chemically neutral materials with the use of carbonaceous substances. It has been proved that the refuse gas, when only passed over red-hot neutral substances, is not materially improved, because, unlike the gases produced from richer materials, there are too few convertible hydrocarbons present; and for the want of carbon, water and carbon dioxide cannot be converted into combustible gases. On the other hand, when leading the refuse gas over carbon alone, the conversion does not take place to a sufficient extent to furnish a useful heating gas, because the fire-clay retorts conduct the heat badly, and the coke has to furnish both the heat for raising the temperature of the gases and vapours and the heat required for the dissociation. In consequence of this double duty, the temperature of the coke rapidly sinks (in particular during the first energetic evolution of the gases) below the dissociation temperature, while the fire-clay walls insufficiently make good this loss of heat. On the other hand, by the combination of the above described operations, a useful heating gas is obtained.

The process is based on the fact that, by first leading the poor gas over neutral material, it is raised to the dissociation temperature, and by then passing it over carbon its conversion is effected. The heating and the conversion are therefore effected by different materials. At the same time, a gas is obtained that is practically free from carbon monoxide, as the gas only contains from 0·3 to 0·7 per cent. of it. The gas, however, contains a notable quantity of nitrogen—namely, up to 10 per cent.; but this can be extracted, and at the same time rendered useful, by passing the refuse gas in a heated condition over a red-hot mixture of alkali-carbonates and carbon, or a mixture of potash, carbon, and pulverized iron or iron oxides. These mixtures are heated to the melting point in an iron vessel in the front end of the converting retort. By the reaction of the nitrogenous gases present, cyanogen compounds are produced under the conditions existing in the retorts.

This cyanogen production, however, differs from that described in Souchou's patents No. 485 of 1852 and No. 924 of 1853, in that rotation of the material introduced is dispensed with, because in maintaining high temperatures, as is necessary for cyanogen formation, the stuffing-boxes of the rotating-shafts cannot be kept air-tight.



In the illustration, A is a fire-clay retort, in which the distillation of the refuse is effected; B is the second fire-clay retort, into which the gases produced in A are led by the connecting-pipe D. The retort B contains, in the space C, paper ashes or other chemically neutral material; while the space E contains coke. In the space F of the retort B is arranged an iron receptacle, which is divided into compartments, and is intended to receive the substances for combining with the nitrogen, and forming cyanogen compounds. Both retorts are built into a generator furnace. The gas generated in A flows into the transforming retort B, where it first passes through the mass of paper ashes, then over the coke, and finally through the receptacle F, whence it passes off, through the discharge-pipe G and the hydraulic main H, into the pipe K leading to the condenser and scrubber.

An essential feature for facilitating the gas formation, and for effecting a rapid distillation process, consists in the provision of a stirring apparatus L projecting into the retort A. This consists of a rod provided outside with a handle, and inside with a stirring blade, which preferably has the form of an inclined surface. The rod passes through the cover of the retort; and by rotating it and pushing it backwards and forwards, the material to be distilled is kept in motion.

The charging of the retort A is effected through the opposite end of the retort, which is provided with a hinged door for this purpose. The charging of the paper and coke into the retort B is effected at suitable intervals through that end to which they are nearest. When recharging with coke (which is effected after about 24 hours), the vessel F serving for the production of the cyanogen is removed and emptied (the contents being further treated in any known manner); and a new vessel charged with fresh material is introduced into the retort. In order to avoid as much as possible any access of air, which would be injurious for the cyanogen compounds, a slide M in the connecting-pipe D is closed during the time that the retort A is being opened and closed.

Manufacture of Water Gas.—Pettibone, H., of New York. No. 7423; April 21, 1900.

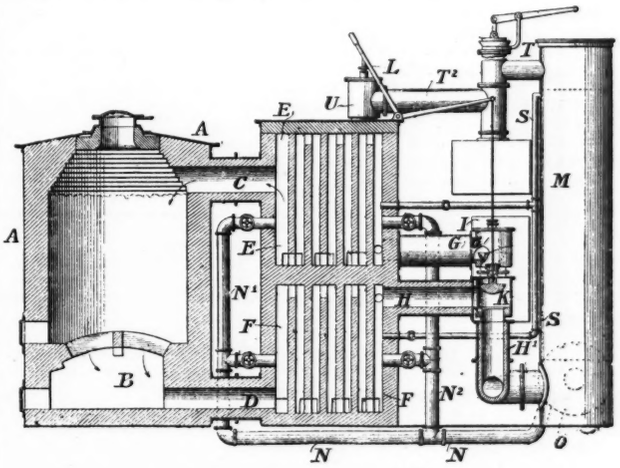
This invention relates to the manufacture of water gas. One object is to provide for producing an increased volume of gas from a given quantity of fuel, and to utilize all the producer gas given off from the generator by burning it in superheaters, and then superheating both air and steam, by passing through the superheaters, on the way to the generator. Another object is "to provide an improved construction and arrangement of the generator and connected superheaters and certain pipe and valve connections, by means of which the body of fuel may be blasted with hot air, passed both upward and downward through it, and by which superheated steam may be passed both upward and downward through the body of incandescent fuel, and the gases passed off both at top and bottom of the body of fuel at alternate periods."

The generator A and the superheaters E and F are constructed of fire-brick, and enclosed in tight iron jackets in the usual manner. The generator is provided with a fuel-opening at the top, and with the clean-out openings near the bottom, in the usual manner. The grate is preferably constructed of fire-brick arches, and separates the fuel-chamber from the usual ash-pit B. The generator is provided at the top with a gas-outlet C, and at the bottom or ash-pit chamber with a gas-outlet D. An air and steam superheater E connects with the upper gas-outlet C, and a separate air and steam superheater F connects with the lower gas-outlet D. The superheaters E and F may be constructed in separate shells, and each rest on its own foundation, if desired; but they are preferably built in one structure, one above the other, with a thick horizontal partition between them, as shown.

The superheaters are preferably constructed with fire-clay partitions forming numerous vertical, connected flues, as illustrated. The superheater E is constructed with the fire-clay partitions forming the vertical flues, and having connecting passages alternately at top and bottom. The superheater F is constructed in a similar manner, with vertical fire-clay partitions forming vertical flues, and having connecting passages alternately at top and bottom. At the bottoms of the superheaters, and in the side walls, are provided clearing-out openings with doors for removing the dust and ashes. A gas-outlet opening and pipe G connects the discharge side of the superheater E with a valve-chamber, and a separate gas-outlet and pipe H connects the superheater F with a valve-box. Both valve-boxes connect with the gas-discharge pipe H^1, which connects with a gas-chamber at the lower end of the steam-boiler M. One valve-box is provided with the usual annular seat and a ball or disc valve K, to which is attached a rod connecting at its upper end to the pivoted lever L. The other valve-box is provided with a similar seat and valve. The valve-boxes are surrounded by the water-tank I, through which water is circulated.

The steam-boiler M is of the tubular kind, and is provided with gas-chambers at the lower and upper ends. A gas take-off pipe T connects the upper gas-chamber with the stack or blow-off pipe. A branch-pipe with a valve-box and valve U controls the flow of water gas to a holder or place of immediate use.

The air-blast is supplied to the generator and to the superheaters under pressure, by means of the blower O (indicated by dotted lines). An air-blast pipe N leads from the blower, and connects with a vertical branch N^1, from which short branch-pipes connect, respectively, with the superheaters E and F near the connection of the upper and lower



gas-outlet pipes C and D, leading from the top and bottom of the generator. A second air-blast pipe N^2 leads from the pipe N, and is provided with short branches, which connect with the gas-discharge sides or ends of the superheaters E and F. A steam-supply pipe S from the top of the boiler is provided with a branch-pipe, connecting with the superheater E at its gas-discharge end; and also with a second branch-pipe which connects at the gas-discharge end of the superheater.

Bunsen Burners.—Lacroix, P., of Paris. No. 7505; April 23, 1900.

The patentee—experimenting with bunsen burners—claims to have found out that it is necessary to adjust the mixing-tube to a more or less eccentric position in relation to the stream of gas supplied from the gas-jet, especially in the case of small consumptions, as this "constitutes an indispensable condition for the perfect working of the burners." Experience, however, has shown that, in practice, the displacement of the mixing-tube parallel to the axis of the tube is sufficient for securing a

perfect result, if care be taken to avoid the use of very defective gas-jets; and this has enabled the patentee to considerably simplify the method of regulating his burners.

Fig. 1 illustrates the theoretical arrangement of burner. O is an ordinary bunsen gas-jet (of soapstone or any other similar substance), with a simple hole formed in the body. It is fixed on a nozzle through which the gas enters, and is directed into a mixing-tube C at the top of which combustion takes place. A tube A, perforated at a suitable height with air-holes, connects the tube B of the jet with the chimney C. This latter is supported by means of six set-screws arranged in two rows of

Fig. 1.

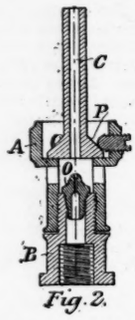


Fig. 2.

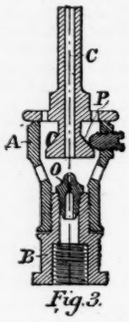


Fig. 3.

three. Thus, the jet being ignited, it is always possible to adjust the mixing-tube C in relation to the direction of the stream of gas from the gas-jet—the necessary position for ensuring the mixing of the air and gas under the most favourable conditions, and "consequently the absolutely perfect combustion of the carbon."

Figs. 2 and 3 represent the two forms very commonly employed by the patentee in his experiments. The mixing-tube C terminates at the bottom in a cone P, against which three screws keep it fixed in the required position in the tube A. The results obtained with these simple and easily regulated arrangements were most satisfactory; but the patentee declares, nevertheless, that the principal object of the present invention consists, not in the particular arrangements described, but "in the possibility of regulating the position of the mixing-tube in relation to the direction of the stream of gas furnished by the gas-jet." Thus, this object may be attained in many ways, independently of those just explained. The cone P could, in fact, be replaced by a seat or base against which a screw in the tube A would act. The screws might thus be arranged perpendicularly to the bottom of the cone P. Or, again, the mixing-tube C might be furnished at the bottom with a screw-thread formed eccentrically in relation to its axis, and screwing on to a nut likewise made eccentric, which would connect it with the tube A. Moreover, the mixing-tube C could be simply fixed to the tube A by soldering as soon as the suitable position had been determined. Finally, the displacement of the mixing-tube C obliquely to the axis of the tube A could be effected by some flexible-connecting arrangement or similar contrivance.

APPLICATIONS FOR LETTERS PATENT.

12,367.—Vollmann, C., and Thielenhaus, F. W., & E., "Time gas-lighters." July 9.
12,381.—Estcourt, E., "Gas and oil motors." July 9.
12,390.—Gray, H. E., "Burners." July 9.
12,438.—Lake, H. H., "Gas-burners." A communication from G. S. Terry. July 10.
12,444.—Melhuish, A. G., "Gas and oil engines." July 10.
12,491.—Seal, J. W., "Oil and gas engines." July 11.
12,512.—Granger, W. A., "Oil and gas engines." July 11.
12,529.—Dawes, M. G., "Gas and like stoves." July 11.
12,578.—Collins, R., "A tubular boiler for gas-retort and other furnaces." July 12.
12,581.—Talbot, H., "Lighting incandescent burners." July 12.
12,671.—Heald, A., "Illuminant appliances for burners." July 13.
12,738.—Liebermann, L. S., "Mantles for incandescent lighting." July 14.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Rating of Water Undertakings.

Sir,—I have read Mr. Wilkins's letter and proposal in your issue of July 19, regarding the rating of water undertakings; and, so far as my knowledge of such matters extends, the method he suggests seems to afford a fair basis for simplifying the rating of concerns belonging to companies. But I agree with you that it would be difficult to apply the system so as to produce equality between the rating of water undertakings which are the property of local authorities and undertakings which are owned by companies.

To your objection, Mr. Wilkins asks whether the cases of local authorities would not be met by taking "a simple percentage on the structural cost." I am afraid Mr. Wilkins made that suggestion without due reflection. What is wanted is something approaching uniformity for all undertakings of a similar class—whether the proprietorship is vested in a local authority or a company. A basis for one distinct from that applied to the other would, I am afraid, be liable to create unfairness between the two, and would tend to the raising of difficulties and issues which would be perplexing and troublesome.

But there is an objection to Mr. Wilkins's "simple percentage on the structural cost" for local authorities undertakings which may be considered fatal. To make such a system fair, the product for a given amount of structural cost should be equal in all cases. But it is not. In one case the works may cost considerably more than in another per million gallons of water yielded or delivered into the town's mains. For instance, I know of one case where water in such abundance is secured from wells that no reservoirs are needed; and that is a town of considerable importance. In another case, large reservoirs have had to be constructed in a rock-bound formation, and the excavation has been a costly matter. In a third case, a large amount of capital has been spent in sinking wells for water which refused to appear except in disappointing quantities. Such widely differing cases as these are not uncommon in water-works construction. And would it (one would like to ask Mr. Wilkins) be fair that the comparatively low structural cost per million gallons yielded in No. 1 case should be placed on the same footing as the high structural cost incurred per million gallons in cases Nos. 2 and 3? I say it would not.

The only way in which I can see that the new suggestion could be applied would be by having a sliding-scale of percentages on the structural cost governed by the yield of water—that is to say, a percentage decreasing with the rise of structural cost per million gallons of yield, with the addition (as Mr. Wilkins suggests) of a specified proportion of any profit derived from supplying water to outlying places. Even then I am doubtful, without extended investigation (for which I have not the time), that this would secure justice between the local authorities.

July 11, 1900. Amicus.

PARLIAMENTARY INTELLIGENCE.

Gleanings from the Committee Rooms.

Our record in the last issue of the "Journal" of the proceedings on the Wandsworth and Putney Gas Company's Bill took us to the point at which the Committee, presided over by Lord Brougham, declared the preamble proved. From the demeanour of the Committee, we had concluded that the Company, having such a respectable record, were going to be allowed to leave Parliament free from the imposition of any harassing conditions; but on the consideration of clauses yesterday week, the Committee were more bountiful to the Local Authorities than was expected. In the first place, the Company are to provide a new road as compensation for the gain which will result from the closing of useless thoroughfares intersecting their works; and they have conceded to the Wandsworth Board a site for a new wharf owing to the loss of access to their existing one. Thus far, no doubt the Company anticipated they would have to go. But then the Board caused the infliction of an additional testing-station farther removed from the works than the one they had granted to them in the Lower House. The consumer had ample protection in this respect provided in the Bill as it came before their Lordships; and we fancy that time will show that the Authority have been mistaken in their view that a station at a distance from the works would be an advantage to the consumer. The illuminating power will now have to be such as it leaves the works that it will reach the distant station at the specified power; and the consumer will, or may, according to circumstances, have to pay the price of this doubtful luxury. The new station is to be located at Putney; and there will also be the one (given to the Board when before the Commons Committee) at the Wandsworth Town Hall. But the Company have the option of deciding whether or not they will continue the one at the works. The Board have also secured the right of instituting testings for pressure at the public lamps; but two hours' notice of intention to do this is to be given to the Company.

The Corporation of London (Various Powers) Bill, which, as our readers may remember, contains a clause enabling them to construct subways in the existing thoroughfares of the City, to prevent the various gas, water, hydraulic, and other companies from breaking up the streets, has passed the House of Lords Committee practically as an unopposed measure. The chief objectors to the Bill in the Lower House were the Charing Cross and Strand Electricity Supply Company, who are now in the City in competition with the City of London Electric Light Company. The Gaslight and Coke Company, who were represented in the Commons by Mr. Pope, Q.C., practically raised no objection, though they are the greatest users of subways. The same Bill also contains a clause (53) with regard to the fixing of public lamp-brackets on the walls of private property. It runs as follows: "The Corporation may affix to the external wall of any building fronting any street within the City any brackets, wires, pipes, lamps, and apparatus which may be necessary or convenient for the public lighting of streets within the City."

HOUSE OF LORDS.

The following further progress was made with Private Bills last week:—

Bill brought from the Commons, read the first time, and referred to the Examiners; Paisley Water-Works Provisional Order Bill.
Bill read a second time and committed: Perth and Paisley Gas Provisional Orders Bill.
Bills reported, with amendments: East London Water Bill, Portland Urban District Gas Bill, South Metropolitan Gas Bill, Wandsworth and Putney Gas Bill.
Bills read the third time and passed: Lambeth Water Bill, Portland Urban District Gas Bill.

HOUSE OF COMMONS.

Tuesday, July 17.

THE DUNGANNON GAS ORDER CONFIRMATION BILL.

To-day the debate was resumed on Mr. P. C. Doogan's amendment to reject the motion for the second reading of the above-named Bill; the matter having stood over for a fortnight in order that, if possible, satisfactory terms might be come to between the parties (see *ante*, p. 93).

Mr. T. W. Russell asked leave to make a statement. It would be remembered, he said, that when the matter was before the House a fortnight ago, he suggested an adjournment in order that negotiations might go forward for the purchase of the gas undertaking by the Local

Authority. That suggestion was agreed to; and he was now in a position to state what had been done. The original offer of the Town Commissioners of Dungannon was to purchase the undertaking for £7000. The Gas Company asked £9000 for it, but consented to refer the difference to an arbitrator to be appointed by the Government. In the time which had elapsed since the adjournment, the local Committee had increased their offer to £8000, and the Company had reduced their demand from £9000 to £8500. There was thus a difference of £500 between the parties; and, although he had worked very hard, he had been unable to get rid of the difficulty. The Order must, therefore, now be approved or rejected by the House. He must say that the Order was a very serious thing for the town of Dungannon, because it fixed the capital of the Company at £9000, the price of gas at 5s. 10d., and the dividend at 10 per cent. As far as he was concerned, he intended to vote against the Bill. The whole Irish representation, north and south, were against it. It was not a Government matter.

Mr. DILLON said the Bill proposed to maintain the maximum price of gas at 5s. 10d., for the purpose of giving the shareholders a dividend of 10 per cent. The accounts of the Company were before them on the last debate, and it appeared that the cash capital outlay was only £4200. All other expenditure had come out of profits over and above the 10 per cent. dividends. The ratepayers had offered to buy out the Company at £8000, which was nearly double the amount of capital put into the concern by the shareholders. Were the unfortunate ratepayers in the future to be forced to pay the enormous price of 5s. 10d. per 1000 cubic feet?

Mr. S. YOUNG suggested that the second reading might be allowed, and the contentious matters left over until the third reading. In the meantime an arrangement might be come to.

Mr. RUSSELL said he could not consent to this course. The third reading might not be reached till the end of the session, when Irish representatives might be absent. The Company would not be in any way prejudiced by the rejection of the Bill.

Mr. JESSE COLLINGS, on behalf of the President of the Board of Trade, supported the second reading. He suggested that contentious matters might be dealt with in Committee.

Mr. MACARTNEY said he proposed to vote against the Bill. Who would be damnified, he asked, if the second reading were refused? Not the consumers, and not the Company. Next year, if the Local Authority chose to apply for powers, the Company would be able to prove the value of their property in a far more satisfactory manner than now.

The motion for the second reading was rejected without a division.

Thursday, July 19.

MUNICIPALITIES AND THE PAYMENT OF INCOME-TAX.

Sir A. HICKMAN asked the Chancellor of the Exchequer whether he would state the reasons why income derived from payments for interest made by municipal authorities was charged with the full duty of 1s. in the pound for the whole period in respect of which it was payable, whereas income derived from similar payments made by public companies or private persons was calculated at the increased rate only since the date when the higher duty was imposed.

The CHANCELLOR OF THE EXCHEQUER: The distinction which leads to a difference of treatment in respect of income-tax between income derived from payments for interest made by municipal authorities and income derived from similar payments made by public companies or private persons lies in the fact that in the latter case the interest is paid out of profits and gains assessable to income-tax, while in the former it is (as a rule) paid, or partly paid, out of rates which are not so assessable. In this latter event, sub-section 3 of section 24 of the Customs and Inland Revenue Act, 1888, applies; and this distinctly prescribes that the rate of income-tax shall be that in force at the time of payment. I think that some public inconvenience is caused by the existing difference of treatment in this matter; and I propose to examine the possibility of adopting a uniform system.

Friday, July 20.

THE SUPPLY OF CARBURETTED WATER GAS.

Mr. J. W. WILSON asked the President of the Board of Trade whether, having regard to the report and recommendations last year of the Departmental Committee appointed in 1898 to inquire into the manufacture and use of water gas, and also to the fact that such gas, made from coke and oil instead of coal, was being increasingly and profitably produced by gas companies, while local authorities having their own gas-works were now debarred from erecting such plant owing to the refusal of the Local Government Board to sanction loans for this purpose until the regulations recommended for the use of carburetted water gas were laid down, the Board of Trade would take steps to frame such rules and regulations at an early date.

Mr. RITCHIE: The Board of Trade cannot give effect to the recommendations of the Departmental Committee by rules and regulations. Legislation would be necessary; and on this point I can only say, as I did in reply to a question put by the honourable gentleman the member for Stepney (Mr. Steadman) on the 25th of May, that in any general legislation the Home Secretary and the President of the Local Government Board would probably have a larger interest than the Board of Trade, and that I cannot make any promise on the subject.

Mr. T. M. HEALY: May I ask whether it is not a fact that analysis showed that in Dublin 20 per cent. of water gas was used contrary to the recommendations of the Home Office Committee?

Mr. RITCHIE: I shall inquire into that.

The following further progress was made with Private Bills last week:—

Bills read a second time and committed: Morley Corporation Bill [Lords], Paisley Water-Works Provisional Order Bill.

Bill reported: Paisley Water-Works Provisional Order Bill [Provisional Order confirmed].

Bills read the third time and passed: Falkirk and District Water Bill [Lords], Gas Orders Confirmation (No. 1) Bill [Lords], Westgate and Birchington Water Bill [Lords], Paisley Water-Works Provisional Order Bill, Water Orders Confirmation Bill [Lords].

HOUSE OF LORDS COMMITTEE.

Monday, July 16.

(*Before Lord* BROUGHAM, *Chairman*, *Earl of* MAYO, *Earl of* DENBIGH, *Marquis of* ZETLAND, *and Lord* PLUNKET.)

WANDSWORTH AND PUTNEY GAS COMPANY BILL.

The Committee this morning entered on consideration of the clauses of this Bill, the preamble of which was found proved on the previous Friday.

Mr. VESEY KNOX, for the Wandsworth District Board of Works, in respect of clause 8, which provides for the closing of certain thoroughfares, proposed two additions under which the Company would have to provide a new road through their works, and certain other road improvements, as compensation for the gain which would result to them from the shutting up of the thoroughfares.

The matter was argued at some length, and evidence taken on the point; the result being a compromise under which the Company, in addition to laying out a new road, conceded a site for a wharf on the easterly end of their property, which would remove the objection the Board entertained owing to the loss of access to their wharf.

Another clause was then agreed to, giving the Local Authority power to say at what depth pipes should be laid in streets not yet taken over by the Local Authority—a matter to which the Gas Works Clauses Act did not apply.

Mr. VESEY KNOX said there were now only two points as to which he and his learned friend had to take the decision of the Committee. The first was as to testing-places; and the second as to gas testing for pressure, as distinct from purity or illuminating power. One of the witnesses for the promoters had said he would have no objection to one of the testing-places being at Putney, which was a portion of the Wandsworth Board's area, and a district further from the gas-works than Wandsworth. At present, there was only one testing-place, which was at the works; but under the Bill there was to be another at Wandsworth Town Hall, which was not far from the works. On reflection, the Wandsworth Board thought there was no public advantage in maintaining two testing-places so near to one another. They therefore asked that, while the testing-place at Wandsworth Town Hall should be adhered to, there should be another at Putney; it being left to the Company, as they might think fit, to maintain or abolish the one existing at the works.

No evidence was called in support of the proposition.

Mr. *H. E. Jones*, for the promoters, objected to the proposal. He said in a gas undertaking of this size it was almost unique to have more than one testing-place. He agreed in the other House to give another place where the petitioners liked; and they chose the Wandsworth Town Hall. If the station at the works were done away with, the Company would not be conveniently placed for watching their gas; and, further, the Company were bound to maintain the station at the works for the benefit of Battersea and other consumers. He strongly objected to giving two stations outside the works.

Mr. VESEY KNOX intimated that Battersea acquiesced in the present proposal.

The CHAIRMAN (after further discussion) said the Committee were inclined to give the testing-place at Wandsworth and one at Putney; and it would rest with the Company to decide whether or not they would have one at their works.

Mr. VESEY KNOX then submitted the following as additions to clause 38:—

(*b*) The testings for pressure shall be made at any of the public lamps, at such times and in such places as the Board of Works for the Wandsworth District may from time to time determine; and it shall not be incumbent upon the Board to give notice to the Company of the time and place at which such testings shall be made.

(*c*) From the observed pressure, one-tenth of an inch shall be deducted to correct for the difference between the pressure of gas at the top of the lamp-column and that at which it is supplied to the basement of neighbouring houses.

He explained that at present the Local Authority, in order to test, had to give notice to the Company, and dig up the main. This was most inconvenient, and practically led to the very infrequent testing for pressure. They held that, as a matter of public convenience, the testing should be done at the lamp post. The only point in dispute, he thought, was as to whether the Board should or should not give notice of intention to test.

Dr. *Wilson Hake*, Gas Examiner to the Wandsworth Board, explained the convenience of the proposal; and, on the point of notice, said it was not at all difficult to alter the pressure in a very short time.

Mr. MOON, for the promoters, contended that the Company should be given notice of intention to test, if penalties were to be proceeded for, as was provided under the General Gas Acts, so that a representative of the Company might be sent to witness the conditions under which the test was made. He did not in the least object to the tests being made at the lamp-post. Surely there was no reason to alter the general law in respect of this particular Company and Local Authority.

A MEMBER OF THE COMMITTEE remarked that if the Local Authority had good reason to think the pressure was low, and then gave notice to the Company of intention to test, the Company could increase the pressure; and so it seemed the Local Authority would have no hold over the Company.

Lord R. CECIL, for the promoters, said if the Committee had good reason to believe that the Company had been behaving badly, they might have some reason to put upon them this surprise testing; but the reverse was the case here. Obviously, if this power were given there would be risk of great unfairness, because the test might not be carried out justly. He pointed out that, under the Act of 1871, a representative of the Company was entitled to be present at such testings, but not to interfere. In reply to the Chairman, he stated that even the Metropolitan Gas Companies had the right to be represented at such tests.

Mr. VESEY KNOX said the position of the Board was that they would be very glad to give the Company any notice they could which would not allow them time to increase the pressure.

Eventually, the Committee granted the clauses brought up, but altered

so that the Local Authority should give the Company two hours' notice of intention to test; and the same protection was given to Battersea.

The clauses were then gone through and adjusted; and the Bill, as amended, was ordered to be reported.

HOUSE OF LORDS COMMITTEE.

Wednesday, July 18.

(*Before the Earl of* CAMPERDOWN, *Chairman, the Marquis of* BATH, *Earl* TEMPLE, *Lord* DE RAMSEY, *and Lord* MONK BRETTON.)

EAST LONDON WATER BILL.

This Bill, which had already passed the House of Commons (see "JOURNAL," Vol. LXXV., p. 1504), came to-day before the above-named Committee of the House of Lords.

Mr. PEMBER, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., Mr. TALBOT, and Mr. GULLY appeared for the promoters; Mr. EARLE represented the Middlesex County Council.

Mr. PEMBER, in opening, said the object of the Bill, briefly stated, was to authorize the East London Water Company to construct additional storage reservoirs and other works, to take further water from the River Thames in cases of exceptional drought and other emergency, to raise further money, and for other purposes. The preamble of the Bill recited that, by an Act of 1886, the Company had been authorized to raise capital to the amount of £1,220,560; that they had secured this amount and expended it, together with £394,440 borrowed on mortgage and £350,000 of debenture stock; and that, by an Act of 1894, the Company were empowered to raise a further sum of £500,000 by debenture stock. In 1897, the population of the district having increased, and being then increasing, the Company were authorized to construct additional storage reservoirs. The experience of late years had shown, however, that the storage reservoirs authorized in 1897 ought to be further supplemented. The preamble further set forth that the Company, in a period of extreme and exceptionally long continued drought in the year 1898, had been obliged temporarily to suspend the constant supply of water to the consumers, and also to restrict the supply. In a like period in 1899, the Company were forced to obtain water from the other Metropolitan Companies, to enable them to ensure the continued maintenance of the constant supply; and such water might not always, in cases of emergency, be available. The Company ought to be always empowered, subject to the assent of the Local Government Board, to draw from the Thames and its tributaries a further quantity of water, and to enter into agreements with other Companies for the purpose of taking their excess water. The present proposal was opposed in the House of Commons by the London County Council and other interested persons; but all the opponents had now retired, with the exception of the Middlesex County Council. The Bill had been before Parliament last year, when, after it had passed the Lower House, it was, to the surprise of most people, rejected by a Committee of the Lords presided over by Lord Brougham. The reservoirs now proposed were a further instalment of the works all along contemplated by the Company. It would be necessary, for the carrying out of the scheme, to acquire certain Lammas lands belonging to private owners, but subject to grazing rights of commoners; and in respect to the taking of these lands, the House of Commons last year had decided that compensation lands should be given to the commoners. Accordingly, in the present measure provision was made for 10 acres being given elsewhere to the commoners. After dealing at some length with the failure of the Company's supply in 1898, Counsel said that probably a further drought would have occurred last year but for the Act passed by Mr. Chaplin, enabling the other Water Companies of the Metropolis to lend assistance. It had been known, ever since the time when Lord Balfour of Burleigh's Commission sat, that the East London Company's storage was insufficient. At that time, it was 610 million gallons only, which was raised by an Act providing for additional storage to 1200 million gallons. The Act of 1897 still further raised the storage to 2440 million gallons. The present was the third and last instalment of the works proposed to the Royal Commission, and would give increased reservoir capacity of 5300 million gallons, which, together with the 2440 million gallons authorized, would give a total capacity of 7700 million gallons; and thus the scheme of Mr. Bryan (the Company's Engineer) which was placed before the Royal Commission would be completed. The estimated cost of the works now sought to be authorized was £1,338,000, which was slightly higher than the estimate of last year; the cost of materials and labour having increased since that time. If the present powers asked for were granted, and the works carried out, East London would be safeguarded from any scarcity of water for many years to come. Although perfectly satisfied with the plans drawn up by Mr. Bryan, the Company had, for the satisfaction of others, consulted Mr. Mansergh, Mr. Hill, and Mr. Eaton, who were probably the three best-known water engineers in the country; and all these gentlemen had reported favourably of Mr. Bryan's scheme. Mr. Mansergh was unfortunately unwell, and Mr. Eaton was detained in Manchester; so that it was impossible to call them. Mr. Hill, however, would give evidence to the Committee. It was significant of the temper of Parliament, with regard to this and other Water Bills of this session, that they had been allowed to proceed, though Lord Llandaff's Commission had reported in favour of purchase, while, on the other hand, the Bills of the London County Council for purchase had been stopped. Under the Bill, it was proposed that from time to time, with the consent of the Local Government Board and the Thames Conservators, the Company should have power to take 10 million gallons daily from the Thames, either by means of their own or other Companies' intakes, more than they were at present entitled to take. It might be possible for the Staines Reservoirs Committee or one of the Companies to give the Company a supply of water; and if this were done, it would not count as part of the 10 million gallons. For this privilege, the Company had to pay £1000 annually to the Thames Conservators. Included in the Act was the seven years, or "sterilization," clause—providing that the power to take this extra water was not to enhance the value of the undertaking if it were bought up within seven years. Turning to the petition presented by the Middlesex County Council, he said they objected to the power taken to break up, and otherwise interfere with, their roads, bridges, and other property, and in particular to the proposed alteration of Lea Valley Road and Marsh Lane. On this point, evidence was taken in the other House; and he should be surprised if Mr. Bryan was not able to prove the necessity for these proposals. The petitioners stated that the proposed works would involve the alteration or diversion of the River Lea, in places where it formed the boundary of the county; that no provision was made for filling up the bed of the old river, from below the reservoirs to where it joined the Lea navigation; and that the Bill should contain a provision to this effect.

The CHAIRMAN: They must propose the provision.

Mr. PEMBER acquiesced. The County Council then alleged apprehension that the construction of the reservoirs would diminish the rateable value of the county, and throw an increased burden upon the ratepayers, without conferring upon them any compensating advantage. He doubted very much whether, considering the way reservoirs were rated, there would be any loss; and if there were, it was a thing which had to be borne by countless places all through the country. The petitioners went on to state that clause 23 empowered the Company, in case of emergency, to take water from the Thames (which was true); and that, by clause 30, it was proposed to empower the Company and any one or more of the Southwark and Vauxhall, the West Middlesex, and the Grand Junction Water Companies to enter into agreements for the taking of any excess water through their intake or intakes. Of the Companies referred to in the Bill, the East London Company and the West Middlesex Company supplied water, not only to the Metropolis itself, but to a large area adjoining, including a considerable portion of the county of Middlesex; and some of the Companies drew their supply, either in whole or in part, from the Thames, the Lea, and other sources in Middlesex. Under the Bill, such of the Companies as obtained supplies from the Thames and other Middlesex sources, but who at present distributed water only within certain defined portions of the Metropolitan water area, would be enabled to deliver water drawn from the several sources referred to in other parts of the said area. The petitioners strongly objected to these extended powers, and to any water to which (as the petitioners submitted) the inhabitants of Middlesex had a prior natural right being used for any purposes, or for the supply of any district, outside the county, other than the districts in which the Companies drawing the supply from those sources were at present under obligation to afford a supply. He thought it was a little late for Middlesex to say the water of the Lea and the Thames was not to be taken for the supply of London. Commission after Commission had said they were to be used for the purpose; and in two Acts the water of the Lea had been handed over to the Water Companies at a price which had just been doubled. Moreover, the essence of the present scheme was that the Company were to store flood water principally. Then the petitioners said the question of the London Water Supply had for some years been under their consideration; and they had arrived at certain conclusions to which, in the interests of Middlesex, they submitted regard should be had—included in them being the necessity for making provision against the sinking of any new wells in the county, the deepening of any existing wells in the county, and for limiting the abstraction of water from Middlesex for the London or any other external supply. They held that provision should be made to secure these objects. The Company, however, were not going to hand water over to the London County Council; and any such provision as that asked for would be fatal to the measure. With regard to the right to limit the sinking of wells, this had been asked for over and over again by Hertfordshire and Middlesex, and refused. The idea was suggested in the most elaborate manner to Lord Balfour's and Lord Llandaff's Commissions; and they declined to adopt it. It would involve a most serious alteration in the common law of England—such as ought only to be made by a General Act, and after full discussion. Obviously, such a principle, if sanctioned, would be applicable, not only to the East London Company, but to all other water companies depending upon wells.

The CHAIRMAN said the petitioners alleged that there were clauses in the Bill carrying out these objectionable things. They said the Bill was defective in this respect. If it was defective, it would be for the Company to establish that such protection was required.

Mr. PEMBER agreed; and he pointed out that new wells were expressly excluded from those things to which the Company might devote the capital raised under the Bill.

The CHAIRMAN remarked that it did not appear, from the petition of the Council, that they alleged that the water the Company wished to take was in excess of needs, or that the Company were asking for undue storage or anything that was unnecessary. It would be a great assistance to the Committee if they knew exactly the points the Council were relying on.

Mr. EARLE said the Middlesex County Council were not going to contend that the principle of storage—if the waters of the Lea were taken—was not a right one; but he was going to say that, in face of the report of Lord Llandaff's Commission and Mr. Chaplin's Act of last year, there was no pressing necessity for the Bill. He was going to submit that the Company were seeking to take water from the Thames, and practically the whole of the further water which was obtainable from the Lea. As the Bill stood at present, the Company were prevented from supplying anything in bulk, whatever the emergency, in Middlesex; and therefore the Middlesex County Council said the Bill was inequitable.

Mr. *W. B. Bryan*, Chief Engineer to the Company, gave evidence in support of the Bill. He said the total population supplied by the Company numbered 1,350,000. As regarded the Middlesex and London portion of the Company's district, there was not likely to be any increase; but rapid increase was taking place in the Essex portion of their area of supply. There the population had increased by nearly a quarter of a million during the last ten or eleven years. The total reservoir capacity of the Company constructed, or in course of construction, was 2400 million gallons, and power was now sought to provide capacity amounting to 5100 million gallons. He estimated that this would carry them on to the year 1919—assuming that the population of the district increased at the decennial rate of 18·2 per cent. At the end of this period, the provision would be equal to a supply of about 64 million gallons a day, which would be needed on the basis of 35 gallons per head per day, which figure, like the 18·2 per cent. of the increase, was accepted by the two last Royal Commissions on the Water Supply of London. The

estimate for the works was £1,338,000. Other items making up the £1,800,000—the total capital power sought—were for engines and machinery, mains and services, ordinary working capital, costs of the Act, completion of wells now under construction, &c. With regard to the temporary supply, it was proposed to take power to abstract further water from the Thames, either through the Company's own intakes or second hand through the intakes of other Companies. This was principally to enable the Company to tide over difficulties which would arise in the course of the next seven years, before they got the reservoirs constructed. He estimated that by or before the end of this period of seven years, the excess water which the Companies now took would be required for their own districts. This water—10 million gallons a day—could only be taken from the Thames on an average of the number of days in the half year; and the Company could not in any one day take more than 30 million gallons. This provision was to enable the Company to get water when the stream was flowing fairly strong.

In cross-examination, witness said the reservoirs would cover about 800 acres, three-fourths of which were in Middlesex. Mr. Chaplin's Act providing for interchange would not meet the case of emergency. This Act would carry the Company over several years, but how long he could not say, because he did not know how fast the population would increase. The promoters would be willing to supply Middlesex in bulk in time of emergency, if they had water to spare.

The CHAIRMAN pointed out that clause 21, as it stood, enabled the Company to enter into agreements to supply water beyond their limits—to the Urban District Council of Cheshunt, which was part of Herts, and any local authority in certain parts of Essex. Was that an agreed clause with Cheshunt or with somebody else? What was the reason the clause was limited in this way; and at what period was it so limited? If he remembered rightly, the Bill, as originally introduced, contained general power to supply water beyond the Company's district.

Mr. BAGGALLAY said, as originally introduced, it was a proposal that the Company might enter into agreements to supply with water in bulk any local authority, company, or person either within or beyond the limits of supply of the Company. This was a general power. In the other House, Hertfordshire appeared; and they objected very strongly that, under the powers of this clause, the Company might take a great deal more water, particularly by pumping from the subsoil, and so affect wells in Herts. Therefore they asked that the power of the Company to supply in bulk outside their district should be restricted. Negotiations followed, with the result that the clause was cut down to places from which applications had already come to the Company for assistance. Cheshunt was one; and Herts agreed to the clause in the modified form.

The CHAIRMAN: Were Middlesex heard upon the point?

Mr. BAGGALLAY: I do not think Middlesex took any part in this question in the other House.

Mr. EARLE: We knew nothing of it till the last moment. I said I objected most strongly to the clause, and left it there.

The CHAIRMAN: I will tell you why I made these remarks. I infer, from what you said some time ago, that it is possible when we come to this clause (if we ever reach clauses) Middlesex may ask us to make it a general clause.

Mr. EARLE: I am going to ask a little more than that.

The CHAIRMAN: I am giving notice now that if Herts and Essex have argued for the limitation of the clause, and been successful, it is well that they should be informed that the clause may be attacked here.

Mr. EARLE: Essex never appeared on this clause at all.

Mr. BAGGALLAY: I think I can save trouble. I have anticipated somewhat what was passing through your mind. While Mr. Pember was speaking, I had an opportunity of talking to Mr. Earle. I thought there was a means of settling this matter. A representative of Herts is in the room, and says he has no objection whatever to making the concession to Mr. Earle which Mr. Earle has asked for. What I offered my learned friend, and what he, I think very reasonably, said he would accept, was this—that the East London Company should by the Act be empowered and required to supply water in bulk in case of emergency anywhere in Middlesex, subject first to the requirements of the Company's districts, secondly to the consent of any local authority or company authorized by Parliament, and thirdly to there being a physical connection by which the supply can be given. This offer, I understand, is satisfactory to my learned friend; and Herts say they have no objection to the insertion of a clause which will give effect to it.

Mr. EARLE said this met his most substantial objections; and although there were other matters which he might have hoped to successfully bring before the Committee, he should not press them.

The CHAIRMAN then formally announced that the Bill might proceed.

The consideration of clauses was postponed.

Thursday, July 19.

The Committee this morning entered upon consideration of the clauses.

Mr. BAGGALLAY, on clause 21 being reached, said it would stand as it was, and the clause with regard to Middlesex would be the next one. It was as follows:—

As to supply to local authorities in Middlesex. In case of emergency only, and so long as such emergency exists in any of the urban and rural districts hereinafter mentioned or any part thereof—that is to say, Friern Barnet, South Mimms, Finchley, Hornsey, Tottenham, Wood-Green, Enfield, Edmonton, Southgate, Hendon, Kingsbury, Wembley, Harrow, Wealdstone, Southall-Norwood, and Willesden, all in the County of Middlesex—the Company shall, on the demand of the Middlesex County Council or the District Council of any of the said districts, as soon as the Company are in a position to supply water from the reservoirs by this Act authorized, supply in bulk by agreement, or failing agreement at the rates mentioned in section 79 of the East London Water-Works Act, 1853, to any such district or part of a district such daily quantity of water as any such Council may from time to time require not exceeding 35 gallons per head per day of the estimated population of such district or districts: Provided always that such supply shall not be given in any district without the consent of the local authority of such district and of the Company (if any) authorized to supply and supplying water within such district: Provided also that such supply shall not be given if, and so long as, such supply would interfere with the supply of water to the district for the time being supplied by the Company: Provided also that the Company shall not be bound to lay down any pipes or make any connection for the purpose of giving effect to this section, but shall give all reasonable facilities to the County Council or to any District Council for making connections with the mains or pipes of the Company for the purposes of giving effect to this section at the cost of the County Council or such district Council making the demand, and under the supervision and to the reasonable satisfaction of the Company. If any question arise between any such Council making the demand and the Company as to whether the Company can supply water under this section without interfering with the water required for their own district of supply as aforesaid, or as to whether such emergency as aforesaid exists, the same shall be determined by an arbitrator to be appointed by the Local Government Board under, and in accordance with, the provisions of the Arbitration Act, 1889.

Counsel said he was only waiting to hear if Hertfordshire agreed.

Lord R. CECIL (representing Herts): No; we do not agree.

The CHAIRMAN: Yesterday somebody appeared, or was said to have appeared for Herts, and agreed.

Lord R. CECIL: I do not think so.

The CHAIRMAN: That was so.

Mr. BAGGALLAY said the Parliamentary Agent for Herts had told him he agreed with the principle of the settlement. He thought it was now only a question of the details of the clause.

Lord R. CECIL: It is very difficult to deal with these things strictly on principle. It all depends on detail what the effect of the clause is. The substantial point is that we are very reluctant, in Herts, to see any increased draft on the underground water in the county; and we feel that this clause will affect that draft.

The CHAIRMAN: Then we will go through the rest of the Bill first.

Other clauses having been adjusted,

Lord R. CECIL informed the Committee that the clause was settled so far as Herts was concerned.

A slight alteration, it transpired, had been made to meet Herts, by inserting the words "from such reservoirs" after the words "section 79 of the East London Water-Works Act, 1853, to any such district or part of a district such daily quantity of water."

Mr. CRIPPS (Parliamentary Agent to the London County Council) interposed at this point, and informed the Committee that the Council opposed this Bill in the other House, terms being agreed. An important matter affecting London was the extent to which water was taken from the Thames. He had only a few moments before had put into his hand the new clause, which he understood had been agreed.

Mr. BAGGALLAY (in reply to the Chairman) said the principle of the clause was, first, that the Company were only to give a supply in case of emergency, and so long as the emergency existed.

The CHAIRMAN: They are to be compelled to do it.

Mr. BAGGALLAY: They are to be compelled to do it, but subject to their having sufficient water for the supply of their statutory districts.

The CHAIRMAN: Do the words "district for the time being supplied by the Company" mean the whole of their statutory district?

Mr. BAGGALLAY: No; that part of the district they are supplying when the emergency arises elsewhere. He added that it was necessary to put it in this way, because the districts of the London Water Companies to some extent overlapped; and under certain Acts the Company were relieved of the obligation of supplying within parts of their district which were being supplied by another Company. All the Company asked was that they should first supply that part of the district which they were *de facto* supplying; and the Company were only to supply outside districts from the proposed new reservoirs.

Lord R. CECIL said Herts did not wish to stand in the way; and therefore, while not altogether thinking it right that this power should be given, they would not offer further opposition.

Mr. CRIPPS asked the indulgence of the Committee. He represented generally the London County Council, and put in an appearance in the House of Commons; but he had not done so here, because the Council, after considering the terms of the Bill—on the assumption that it would pass in the form in which it was brought into the House of Lords—had no ground of opposition.

The CHAIRMAN said no one had any right to assume anything with regard to a Bill. No one could know what a Committee would do.

Mr. CRIPPS suggested that the Committee were here putting in a clause affecting absent parties, of which no notice had been given to those parties. This clause would authorize the abstraction of a larger quantity of water from the river for a district in Middlesex which at present had no right to take that water.

The CHAIRMAN said it was not true that no notice of the clause had been given. Notice was given in the petition of the parties who appeared against the Bill.

Mr. CRIPPS: That does not come before other parties.

Mr. PEMBER: Yes; they had seen the petition in the first House.

Mr. CRIPPS said if he represented any other than a large corporate body, he would be able to at once put in a petition against alterations. With the London County Council it was impossible to so act in five or ten minutes. The point raised was just such a one as had been discussed between the County Council and the Companies for years past. He believed he was right in saying that this Bill was discussed in the House of Commons between those who represented the Council and those who represented the Companies in that House; and he understood it was a matter of arrangement in the House of Commons.

The CHAIRMAN said he had nothing to do with private members, but only with the proceedings before the Committees in either House. What went on in the House of Commons, he had nothing to do with. He (Mr. Cripps) must prove his right to be heard.

Mr. CRIPPS said he quite admitted that he had no petition. He held, however, that he was entitled at that moment to present a petition against alterations, although he could not do it on behalf of the London County Council, because that body only acted by resolution; and it was necessary to obtain the seal of the Council to a petition.

Mr. PEMBER said his position was simply that in the last House the Middlesex, London, and he believed Herts County Councils had petitions against the Bill. He opened the Bill; and on the "sterilization" clause being put on the Company, the Council withdrew from further opposition. He had no arrangement with them at all. The Council knew of the other petitions, and must be taken to have known what was in those petitions. If they had any interest in the Bill, they ought to have guarded it in the ordinary way. They were not present with a petition on the merits of the Bill or against alterations; and he did not see why they should be heard.

Mr. CRIPPS said, although the Council differed from the Company as

to the desirability of taking more water from the sources proposed, yet, having regard to recent decisions, they were satisfied that the Bill should go on as it left the House of Commons. They did not petition against alterations; relying on the usual practice in the House of Lords.

The CHAIRMAN said every Bill which came to the House of Lords had to be considered, and might be altered.

Mr. PEMBER remarked that clause 21, as it stood originally in the Bill, was a general clause allowing the Company to supply in bulk. It was the Herts County Council who led the Company to modify it so that, even with the Middlesex provision in, it would not be as wide as originally.

The CHAIRMAN informed Mr. Cripps that so far he had not established a *locus;* and he asked if he had any further argument.

Mr. CRIPPS said he had nothing more to say. This was a new power inserted in the Bill which would affect his clients.

The CHAIRMAN (after briefly consulting with his colleagues) announced that the clause was accepted.

Mr. PEMBER said that, having regard to the fact that an attempt might be made elsewhere to strike out this clause, on the ground that the County Council had been taken by surprise, he wished again to point out that the addition allowed by the Committee did not make the clause as large as it was originally.

The CHAIRMAN: Certainly not; and I wish further to say that any parties who desire that the Bill should remain in the form in which it came to this House ought, according to the ordinary practice, to have put in a petition against alterations. If they chose not to watch the Bill, it is their fault, and their fault alone. This House, of course, in any Bill which comes before it, has power to make amendments. What is this Committee appointed for, except to make amendments, if necessary?

The remaining clauses were then gone through and adjusted; and the Bill, as amended, was ordered to be reported.

THE PARLIAMENTARY COMMITTEE ON MUNICIPAL TRADING.

The Joint Committee of the Houses of Lords and Commons who are inquiring into the subject of municipal trading (see *ante*, p. 166) held a further sitting last Tuesday, under the presidency of the Earl of Crewe; the other members of the Committee present being Viscount Peel, Viscount Hampden, Lord Rothschild, Lord Windsor, Sir W. Foster, Sir W. Dunn, Mr. Grant Lawson, Mr. H. Hobhouse, and Mr. Lewis Fry.

The first witness called was Mr. John Moore Hayton, Town Clerk of South Shields, whose evidence bore upon the practice of paying Town Clerks inclusive salaries. He was followed by

Mr. *George Livesey*, who was examined by the CHAIRMAN. Witness said he was Chairman of the Gas Companies' Protection Association, and of the South Metropolitan Gas Company. He had had a life-long experience in the supply of gas generally.

The CHAIRMAN: What do you consider to be the first and chief public consideration in connection with the supply of gas?

Witness: The interest of the gas consumers, unquestionably.

Can their interest be best promoted by local authorities or by companies?—In my opinion, they can be best promoted by companies.

Do you found that opinion on any parliamentary return?—I have here a number of instances of prices charged, taken from "Field's Analysis."

Witness handed in the following table; explaining that these analyses of gas accounts were compiled by Mr. J. W. Field, the General Manager of the Gaslight and Coke Company, who first began them on a large scale in 1883.

TABLE A.—*From "Field's Analysis."*

Price Charged for Gas by Companies and Corporations in 1883 *and* 1899.

	Per 1000 Cubic Feet. 1883. s. d.	1899. s. d.	Reduction. s. d.
GAS COMPANIES (METROPOLITAN)—			
Gaslight	3 1½	3 0	0 1½
Commercial	2 10	2 6	0 4
South Metropolitan	2 10	2 1½	0 8½
SUBURBAN—			
Brentford	3 7½	2 11	0 8½
Bromley	4 0	3 0	1 0
Croydon	3 6	2 8	0 10
Crystal Palace District	3 1	2 6½	0 6½
Lea Bridge	4 10½	3 9	1 1½
Mitcham	4 3	3 8	0 7
Richmond	3 6	3 0	0 6
Tottenham	3 8	3 0	0 8
Wandsworth	3 4	2 2	0 10
West Ham	3 6	3 0	0 6
PROVINCIAL—			
Bath	2 6	2 4	0 2
Brighton	3 3	2 9	0 6
Bristol	2 7	2 3½	0 3½
Newcastle-on-Tyne	1 10	1 9	0 1
Plymouth	1 11½	1 9	0 2½
Portsea	2 11	2 4	0 7
Preston	3 1	3 0	0 1
Sheffield	2 3	1 9	0 6
CORPORATION GAS-WORKS—			
Birmingham	2 4½	2 2	0 2½
Bolton	2 8	2 6	0 2
			Increase.
Leeds	1 9½	2 0	0 2½
			Reduction.
Leicester	2 6	2 4	0 2
Manchester	2 8	2 3	0 5
Oldham	2 8½	2 1½	0 7
Salford	3 0½	2 1½	0 11

The CHAIRMAN: Mr. Field's figures are undisputed?

Witness: They are always accepted before Parliamentary Committees. It is a difficult matter to make selections of companies and corporations; and I have taken every one given in "Field's Analysis," both in 1883 and 1899. I selected 1883, because that was the first year in which Mr. Field's returns were published, except as regards the London Companies. I find that the average reduction made in the case of the companies is a trifle over 6d. per 1000 cubic feet; while the average reduction in the case of corporations is barely 4d.

Sir W. FOSTER: What is the first year in which the corporations began to supply gas?

Witness: The first figures we have relate to 1883.

There were then comparatively few of them supplying gas?—There are only seven dealt with in the "Analysis." They began before 1883; but we have not the figures prior to that.

The CHAIRMAN: Have you anything to say on the actual price, as distinct from the amount of the reduction; because the value of a reduction depends on the figures in each case?

Witness: Yes; it does. It is, of course, much easier to take 6d. off 3s. 6d. than off 2s. 6d. I have ascertained from the latest parliamentary returns the number of gas companies and of local authorities supplying gas, and the quantity sold in each year. The returns relate to the year 1898, when there were 439 gas companies, with an annual sale of 89,077 million cubic feet; and 222 local authorities owning gas-works, and selling 47,287 million cubic feet in the year. The companies therefore, roughly speaking, are nearly double the number of the gas-selling local authorities; and the quantity they dispose of is not far short of double that sold by the latter.

What do you say are the main reasons given in favour of ownership of gas undertakings by local authorities?—The first reason given is that they alone should have the right of opening the public streets. More can be said against this contention than in its favour. It is often said that, no sooner have a local authority repaved a street than the gas and water companies tear it up again. This has happened in some cases; but I think it would have occurred in as many instances if the local authority had owned the undertakings. The companies receive notice when the streets are to be opened up; and they take advantage of the opportunity to do whatever is necessary to their mains, and whatever they think may be needed for some years to come. So that it is very rare indeed for a street to be torn up unnecessarily. There is another thing to remember. If the local authorities had the gas and water pipes, they would not be nearly so considerate of the welfare and convenience of the public as a company, in the matter of taking up the roads. They are masters of the roads. They would stop a road altogether, where a company would not be allowed to do so. If a company want to stop a road, they have to give notice to the local authorities; and the local authorities exercise a very stringent control over them. They will not allow them to interfere with the public traffic any more than is necessary; and a company will often employ double gangs of men, in order to get the work done as soon as possible.

Do you approve of the practice of a corporation undertaking work for a company with their own men?—No. The fact is that the London County Council men are becoming a bye-word and a laughing-stock to the man in the street.

Sir W. FOSTER: Is your evidence as to local authorities founded on London alone?

Witness: Yes. I may say that, as I was riding on the top of an omnibus recently, the driver said to me: "Look at those men all standing there—London County Council men. If that work had been put in the hands of Mowlem, it would have been done before now; whereas the London County Council men have been at it for a fortnight, and they have only done one-third."

The CHAIRMAN: They were not laying gas-mains?

Witness: No; they were at work at the end of the Tottenham Court Road, where a block of buildings had been removed. I think it is far better that such work should be done by a company, who have somebody to look after them, and to compel them to do the work as expeditiously as possible in the public interest.

It is also contended that corporations can raise money at lower rates than companies?—That used to be the case. Prior to the introduction of the auction clauses, in 1877, all gas capital was issued to the shareholders at par; and the minimum rate of interest was 7 per cent. Such capital was issued whenever extensions of business took place; and, of course, the consumer had to pay the 7 per cent. on the increased capital. At that time, local authorities could raise money at much lower rates—2 or 3 per cent. lower, probably. Since the auction clauses were introduced, all new gas capital has had to be raised by auction; and the result is, in the case of my own Company—the South Metropolitan—that we are raising all our capital for extensions of works now at something under 4 per cent., taking share and loan capital together. Local authorities cannot do it any more cheaply. About 3 per cent. is the rate at which they can raise money; and then there is a sinking fund of 1 per cent., which brings the interest up to about the same rate as that of a company.

What do you consider to be the main reason for the desire of corporations to own gas-works?—In England, unquestionably, the desire to appropriate the profits out of the pockets of the consumers to aid the local rates. If they were not allowed to take excess profits in aid of the rates, there would be very few transfers of gas companies' undertakings to corporations.

In Scotland that does not apply?—No; no surplus profits can be legally so used there.

Do you find that local authorities are willing, in Scotland, to buy out the gas companies?—Nearly all the Scotch gas companies were taken over many years ago. Glasgow, for instance, purchased theirs in 1870; and they were really ahead of England in managing corporation gas-works. It is since that date that the greater number of English corporations have taken over gas-works.

I do not know that I quite follow your argument. Why should not the contention that you say affects English corporations not apply to Scottish corporations?—There are very few gas companies taken over by Scottish corporations. The argument used by an English corporation when introducing a Bill or promoting an agitation for the purchase of a gas undertaking is always: "We shall have so much profit to go in aid of the rates."

Now, what objection do you take to the allocation of profits to the rates?—My objection is that the profit comes out of the pocket of the consumer of gas—that the gas consumer has to bear all the burden of

interest on capital, sinking fund, depreciation, and everything else. By their Acts of Parliament, local authorities are allowed to charge a price for gas which will be sufficient to pay interest on the capital outlay, to provide a sinking fund to redeem the capital in a certain number of years, and, in some cases, to provide for the depreciation fund. Should the profits of an undertaking at any time not be sufficient to meet all these charges, the local authorities, of course, have the power at once to raise the price of gas; so that, whatever may happen, the consumer has to pay all these charges. To charge him a price in excess of what is necessary, and to make him pay for the redemption of the capital, is, in my opinion, most unjust.

Witness went on to refer to a discussion which took place recently at a meeting of the Manchester City Council, as reported in the "JOURNAL" for May 22 last. A proposal was, he said, made that the price of gas should be raised, in order that the Committee might continue to pay over to the borough funds £50,000 a year.

Viscount HAMPDEN: Was that owing to the increase in the price of coal?

Witness said that was the case. It was proposed to increase the price of gas by 3d. per 1000 cubic feet, in order to hand over the £50,000. Alderman Gibson, the Chairman of the Gas Committee, was not present when the recommendation was made by the Committee; but at the meeting of the Council he made a speech that was very much to the point. He expressed the opinion that they had no right to tax one class of the community for the benefit of another; and he said that, by raising the price of gas without any necessity, they would be taxing the poor shopkeeper, who was already overburdened by what he was paying.

The CHAIRMAN: But, as a rule, the objection taken in a case of this kind is that it is hard on the large consumer, rather than on the small consumer, is it not?

Witness: Sometimes. At any rate, the incidence is altogether unfair. If everybody burnt gas, and the rate at which they used it corresponded with the rateable value of the houses they live in, it would be as broad as it is long; but, of course, that is not the case. Gas is not burnt in anything like equal quantities by different consumers. The small shopkeeper burns a great deal more than his proportion, compared with his rateable value.

Have you anything more to suggest as to why corporations interest themselves in these enterprises?—Well, I have watched this thing very closely; and I have noticed that a considerable number of Socialists, and men with socialistic tendencies—a number totally out of proportion to those in the community—get elected on local boards and corporations. They push themselves forward. These men have an idea that collective ownership is the right thing. What they want to see is the application of collective ownership to the manufacture, distribution, and exchange of all commodities. I am satisfied that a number of these men on town councils go in for schemes for the purchase of gas companies for the purpose of carrying out their favourite idea of collective ownership. I was talking recently to a prominent gentleman—a member of the London County Council—about the South Metropolitan Company's system of inducing the workmen to become shareholders, and of offering our stock to the consumers of gas; and I said: "I think you approve of that." He replied: "No; I do not. What I want is to see collective ownership of gas-works—not that the consumers and workpeople should own them, but that they should be owned by the ratepayers."

But it is not the case that the people holding these Collectivist views are in a majority on any body?—Well, on some bodies they are. They are at West Ham and in the parish of Bermondsey. They do not avow their views. In advocating a purchase, they do not avow their Collectivism; but they take a strong line in favour of purchase. I think the tendency is most mischievous.

Sir W. FOSTER: Is there any other instance you can give of local authorities in the country generally having a majority of that class of representatives?

Witness: I do not know.

You only know of two?—Well, they are giving a good deal of trouble, even in a place like Glasgow. They are trying to get the control of the gas-works into the hands of the Trades Unions. They have made a determined effort this year in that direction. The gas-works there are administered by a very able, thoroughly honest, and capable man; but the Trades Unions want to get control. For instance, in the winter time many more men are employed than in the summer. Some members of the Trade Union were dismissed, as men must be when the long days come in; and these people got up an agitation, stating that they were wrongfully dismissed. There was really a hard fight in the Council about it.

But surely you would give liberty to every class to ventilate a grievance, if they have one. You cannot treat these people differently from others?—All I can say is that if they get control of the gas-works they will not be managed as well as they are now.

The CHAIRMAN: What do you say on the monopoly argument?

Witness: The argument is that the supply of gas, being a monopoly, should be in the hands of the local authority. Shortly, I say that it is necessarily a monopoly; but it is a monopoly that has been regulated by Parliament. If you are to have a monopoly, you will fare better if you have some control over the monopolist than if you leave it an uncontrolled monopoly. If the gas supply were put in the hands of corporations, they would be absolute masters of it. A monopoly controlled by the local authorities is far more likely to serve the public well than a monopoly in the hands of the local authorities, and therefore without control. I say that a consumer is far better served under a company than under a corporation. He counts for nothing under a corporation; but under a company, in London, for instance, he can go to the London County Council, and the County Council, being a powerful body, can take measures to bring the company to book. If the London County Council had the supply of gas in their hands, the individual consumer would have no one to appeal to against them. It is because corporation monopolists are in this position, that they take large sums of money from the consumer in aid of the rates. That is done in Manchester, though Manchester is not the worst case. The worst case is Bolton, where the amount taken in aid of the rates is 7d. per 1000 cubic feet.

One would have supposed that, if the gas consumers as a body considered themselves aggrieved, they would have been able to alter the composition of the Corporation?—No; I think not.

Not if all the gas consumers in Bolton combined?—The interest of the individual gas consumer is too small to induce him to take it up as a public question.

If he does not mind, where is the grievance?—Well, I think he does mind. He grumbles and pays.

Still, he has that remedy. You rather seem to imply that the corporation could not be touched in any manner. The consumer has that remedy, if he gets others to combine with him?—Yes; but there are so many questions—political and others—brought forward when an election takes place, that the gas consumer is relegated very much to the background.

It is contended that consumers derive greater benefits under municipalities than under companies. What have you to say about that?—It has been said that they get their gas cheaper; and in proof of that reductions in price have been quoted. Well, the tables I have prepared on this point are only good as far as they go, because comparisons are exceedingly difficult to make. The circumstances of the gas undertakings in one town and another are very different. Take, for instance, the difference in the supply of coal. You cannot compare a gas undertaking in the South of England, hundreds of miles from a coal supply, with one (say) in Durham. There are also other circumstances to take into account; and it is therefore very difficult to produce any proof on the point. In Table B, I have endeavoured to take companies whose circumstances are comparable.

Witness put in the table, which was as follows:—

TABLE B.—*From Parliamentary Returns*, 1899.

Prices charged for Gas by certain Gas Companies and Corporations under somewhat similar conditions.

Companies.			*Corporations.*		
City or Town.	Millions of cubic feet sold.	Price of Gas. s. d.	City or Town.	Millions of cubic feet sold.	Price of Gas. s. d.
NEWCASTLE DISTRICT.					
Newcastle-on-Tyne	2305	1 9			
Sunderland	783	1 9			
South Shields	443	2 3	Middlesbrough	432	2 0
Hartlepool	319	2 1	Stockton-on-Tees	339	2 6
Tynemouth	258	2 0	Darlington	245	2 0
YORKSHIRE.					
Sheffield	2304	1 9	Leeds	2650	1 11
York	416	1 10	Bradford	1620	2 1
Derby	457	2 5½	Nottingham	1503	2 3
WARWICKSHIRE.					
Leamington	186	2 4	Coventry	480	2 4
LANCASHIRE (all over 300 milliions).					
Liverpool	3330	2 9	Manchester	4194	2 3
Preston	402	3 0	Salford	1264	2 3½
Ashton	302	2 0	Oldham	1101	2 1
			Bolton	889	2 6
			Blackburn	540	3 3½
			Burnley	472	2 3
			Rochdale	451	2 7½
			Southport	389	2 9
			Blackpool	371	2 4
			Wigan	327	2 7
			Bury	326	2 2
KENT.					
Margate	190	2 6	Ramsgate	178	2 8

The CHAIRMAN: The prices you give are in some cases the average of several prices?

Witness: In some instances they are; but I think it may be taken that they are fair, representative prices.

Viscount HAMPDEN: What is the South Metropolitan Company's price?

Witness: We have raised our price to 2s. 8d. per 1000 cubic feet from Midsummer. We reduced it to 2s. 1d. last Midsummer. We raised it to 2s. 4d. in March; and we have now raised it again to 2s. 8d.—a total increase of 7d. per 1000 cubic feet.

And do you know whether corporations have done the same thing?—Some of them. It would be altogether misleading to take the year 1900 for purposes of comparison, because some coal contracts expire in June, some in March, and some in November. Our contract terminated in March. Some have contracts running to 1901.

The price of the Leeds Corporation gas is very low?—Yes; Leeds is one of the lowest. In 1883, Leeds was selling gas at 1s. 9d. per 1000 cubic feet. The Corporation did not at that time appropriate anything in aid of the rates. Since then the Sheffield Company's price has come down, and the Leeds Corporation's price has gone up. Leeds is now appropriating some of the profits in aid of the rates. I say generally that companies can supply the public better than local authorities.

The CHAIRMAN: You say that corporations ought to be able to charge less than companies?

Witness: Yes; because all the capital of corporations has been raised at a low rate, and is constantly being reduced, through loans repaid and annuities redeemed. Consequently, the charge per 1000 cubic feet to pay interest on capital is generally much lower than with companies. "Field's Analysis" for 1899 gives an average of 4·79d. per 1000 cubic feet sold in the case of English corporations, for interest, depreciation, and sinking fund; while for English provincial gas companies the average given is 7·92d.—a difference of over 3d.

Have you ever worked out the prices at which corporations could supply gas, supposing they devoted the whole profit to reduction?—I have a table here about the appropriation of profits. It shows that Birmingham, in 1899, appropriated 1½d. per 1000 cubic feet in aid of the rates, so that the Corporation could have supplied gas at 1½d. less. Bolton, in the same year, took 6¾d. in aid of the rates, and Carlisle 5¾d.

What was Bolton charging then?—2s. 6d.; and therefore they could have sold at 1s. 11½d. Birmingham was charging 2s. 2d., and could have supplied at 2s. 0½d. Carlisle was charging 2s. 3d., and could have sold at a little over 1s. 9d. Leicester took 4·39d., and sold at 2s. 4d.; so that they could have sold at 2s. Manchester took about 3d., and charged 2s. 3d.; so that they could have sold at 2s.

That will do for instances. Can you give reasons why corporations

do not as a rule make any lower charge, as you state, than gas companies?—They have really no inducement to charge at the cheapest rate; and gas companies have. Since the introduction of the sliding-scale in 1876, the interests of consumers and companies have become identical. The sliding-scale allows an additional dividend to be paid for every penny of reduction in the price of gas. This does not operate in the case of corporations. Companies have very serious competitors. Mineral oil is perhaps the most serious competitor they ever had. In many cases, they have to compete with the electric light too; and in order to hold their own, it is necessary that they should sell gas at the lowest possible price. This is an inducement which, I think, does not apply to corporations.

What do you think influences corporations in fixing the price?—I think they are influenced by the charges made by companies and corporations in neighbouring towns. If the companies in their neighbourhood are selling gas at a much lower price than themselves, they will try to bring down their own price. Otherwise comparisons are instituted by the consumers—say, as between Leeds and Sheffield. Another influence is the price charged by other corporations. Take Nottingham, Birmingham, and Leicester. In 1898, both Birmingham and Nottingham charged 2s. 3d., and Leicester 2s. 4d. If Leicester were selling gas at 2s., Nottingham consumers would not be content to pay 2s. 3d.

What have you to say as to the position of the gas committees of corporations?—I say that for efficient management you want something like continuity; and with the constant changes that take place in corporation committees, you cannot have this continuity. Moreover, it has been noticed for many years among gas people that the corporations are not willing to treat their responsible officers with sufficient liberality to get the best servants. Many of them treat them as well as the best companies; but, speaking generally, they do not. I refer both to rates of pay and general consideration; and I know that most of the officers of corporations would be very glad to exchange into the service of companies, where they would obtain more encouragement to do their work with intelligence and enterprise than they get under corporations. Leeds is very much under the control of Trades Unions. I think that if all the gas undertakings of the kingdom were in the hands of corporations, there would be very little further improvement in the gas supply; and I am pretty safe in saying that reductions in price would practically cease. The companies, in fact, set the pace; and the corporations follow.

You think that, the supply of gas being necessarily a monopoly, it should be regulated by Parliament and controlled by the local authorities?—Yes.

You think that companies have greater inducements than corporations to serve the public well?—Yes; and that they have greater inducements to enterprise. I would mention the slot-meter system. I have been in the gas business all my life; and I can say that there has been nothing like the development in the use of gas in the whole history of gas supply, that has resulted from the introduction of this system. It has all been in the last ten years; and I know of companies who have doubled their number of consumers in that period. The South Metropolitan Company have obtained 100,000 slot-meter consumers in eight years. It was the companies who were the pioneers in this matter—Liverpool taking the lead. If the gas supply had been in the hands of corporations, there would have been nothing like the progress that has taken place. The companies started it, and the corporations have followed; but they have not progressed to anything like the extent that the companies have.

You regard gas shares as a very good form of investment for various people?—I think they are a very popular form of investment. If they have not such investments, what are people to do with their savings?

Of course, to some extent corporation stock would take its place?—Well, the London County Council recently offered stock; and, on going through the list of applications, I found that they were for very high amounts. I know, as a matter of fact, that gas companies' shares are very popular in provincial towns, and that consumers are very ready to take gas stock when it is offered them.

You consider that companies can deal much better with labour questions than corporations?—Unquestionably. There are only two companies who have adopted the profit-sharing system; but what two have done, there is no reason that all should not do. The South Metropolitan workpeople hold £100,000 worth of stock; and nearly all the workpeople of the Crystal Palace Gas Company are shareholders.

Why has not this system been more largely adopted?—It is owing to the innate conservatism of the British race. The other companies are waiting to see whether it is a success.

And you think companies have more reason to serve their customers well, and to please them, than corporations have?—Undoubtedly.

Lord Rothschild: Do you think that the sale of bye-products, and the use of them, would be greater if gas undertakings were in private hands than if they were in the hands of municipalities?—I think it would be better to have them in the hands of gas companies, who have a direct interest in selling their bye-products to the best advantage; because if they can get a higher price for their bye-products, they can sell their gas more cheaply and obtain an increased dividend.

Viscount Peel: I understood you to say that the poor shopkeeper was very often charged unduly for gas, while the great manufacturer who consumed electricity paid nothing at all towards the rates in that way?

Witness: I was quoting from Alderman Gibson.

Do you think this prevails in many corporations?—Well, I will take London. In the north of London, a very large amount of electricity is used. The small shopkeepers burn gas. If the supply of gas were in the hands of a corporation, and a great amount of profit were taken in aid of the rates, the small shopkeeper would have to contribute more towards the rates than the man who used electricity.

Are there many cases where corporations manufacture both gas and electricity?—They do it in Manchester.

Do they get profits out of the electrical supply?—I do not know. I am afraid not.

That is an argument that corporations should only supply one form of light and power?—My argument is that corporations should supply nothing that can be done by private enterprise.

Have you ever heard any complaint from the consumers of gas in Birmingham that they are not fairly treated, and that they ought to get their gas at a much lower rate?—No; but the difference would be only 1½d. per 1000 cubic feet. If there were a difference of 6d., I think that the Birmingham constituencies, being enlightened, would not have stood it.

Sir W. Foster: They would have changed the Corporation.

Viscount Hampden: Your evidence is directed against the policy of Parliament encouraging corporations to take over gas and water supplies?

Witness: With all due respect to Parliament, I think it is a mistake.

Do you think it within the region of possibility that Parliament will go back on the policy it has pursued for a number of years, with respect to the supply of gas and water?—Water is different from gas. I do not say it is possible to turn back the policy of Parliament, though we have done it this year in regard to illuminating power. I think it would be possible to induce Parliament to say to a corporation: "You may have the gas supply if you like; but you must not make a profit out of it."

Why should not a corporation deal with the profit as they wish?—Because it is an injustice to the gas consumer to make him pay in aid of the rates.

But surely the remedy is in the hands of the ratepayers. Why cannot you leave it there?—Experience shows that the gas consumer, as a ratepayer, will not take it up.

There is an old saying that the gods help those who help themselves.—I am afraid that they cannot help themselves.

Sir W. Foster: Is it not within your knowledge—and I think within your personal experience—that in many provincial towns, where the corporations have taken over the gas-works there has been an improvement in the supply?

Witness: Yes.

If you look round these Parliament Houses any evening, do you think there is any large city in Europe where the lighting is so bad?—That is entirely the fault of the Local Authority.

But the Local Authority do not supply the gas?—They say how much has to be supplied; and the Gas Company have nothing to do but carry out the order of the Local Authority.

And have you noticed the burners?—Yes; and I have noticed your magnificent lighting in Birmingham. The parish authorities in London control the lighting absolutely. London, I am prepared to admit, is one of the worst lighted places to be found; but that is not the fault of the Gas Companies.

London has not had corporations, and has had no opportunity of exercising the same kind of municipal enterprise as Birmingham and Glasgow have exercised?—The public lighting of some provincial towns is what is called free. No charge is made; and this means that the private consumer must pay for it.

You think that a small retail shopkeeper in a back street has more influence over a company than he would have over a corporation?—I think so.

He may be an active politician?—Oh, then he would have more influence over a corporation.

Lord Windsor: Supposing corporations were debarred from making a profit, would you not say that they could supply gas cheaper and serve the public better than companies?

Witness: I say they ought to; but they have not the inducement of self-interest.

You say that other things come in; and that, as a matter of fact, they do not?—I say that there are certain corporations (and I am very glad to say that Birmingham is one of them) who treat their officials well, and have good and enterprising officers, but that, speaking of corporations generally, there is no inducement to their officers to do their best.

The Chairman: Do you know of any cases of actual mismanagement of gas undertakings by local authorities?

Witness: I think so; and I know of cases of mismanagement by companies too.

Can you give instances of actual mismanagement of gas undertakings by local authorities?—There are local authorities who have muddled things very much.

But you are not prepared to give any evidence on that point?—I think it is rather an invidious task to mention names.

It does not occur to you that it would strengthen your case, because I am bound to tell you that the evidence we have had so far is that gas undertakings have been exceedingly well managed by corporations?—Many have been. The undertakings of Glasgow, Nottingham, Birmingham, and Leicester are very well managed; but there are others that are not, though I should not like to give the names.

At the close of Mr. Livesey's evidence, Mr. James H. Kelly, of the Traders' Defence Association of Scotland, was called. He said he represented the views of that body, the members of which numbered 2800. He considered that municipalities had facilities which established unfair conditions in trade and commerce. He regarded it as a menace to the State that a municipality, working with the object of having little or no profit, did not contribute to the State by paying income-tax, with the result that traders had to pay increased taxation. The same thing happened with regard to local rates. The Association admitted the municipalization of water and gas undertakings, as these did not lend themselves to competition; and, as far as Glasgow was concerned, the citizens were very well served in respect of both gas and water. He had not the same opinion regarding the tramways or the building operations which the Corporation of Glasgow had undertaken. Tramways were merely a means of conveyance, and were a form which could be taken up by anyone. Their building operations were unfair competition with private enterprise. As far as the object of the operations might be to clear slum property, he had no objection whatever to a corporation putting up a cheap class of house, such as private enterprise would not undertake to do; but, in the case of Glasgow, they were putting up substantial houses. Proceeding to speak on the question of municipal employees, he said he regarded the risk attending the employment of a large number as very considerable, and this condition existed in Glasgow. Municipal employees, as a rule, gave their votes in favour of the nine members of the Town Council who were Trades Unionists; and not only so, but they induced other labour parties to do the same. What he was speaking against was the growing evil of increasing the number of employees, so that they might have undue influence on the Council. The Lord Provost

of Glasgow had stated in his evidence that the municipal debt of the city had been more apparent than real. In the last ten years it had risen from £5,000,000 to about £10,000,000, and the taxation of the city had risen 5d. in the pound. This was real enough for those who had to pay it; and in the face of the increased taxation and debt, it was scarcely wise for a Corporation to devote their attention to other enterprises. There was not much to be said on the electric system of Glasgow. The Corporation took powers to prevent a company from getting in. His complaint was that, having obtained the powers, the Corporation did not use them. As to telephones, he did not think it was necessary to take over a telephone system if a company could conduct it as well as any other body. Gas and water supplies were about the limit to which he was inclined to allow corporations to go in respect of trading. He would not necessarily include electric lighting. Admitting the extent to which corporations had taken up municipal trading, there were so many auxiliary trades involved that the difficulty of defining a limit was increased.

The Committee held a further sitting on Friday, when Dr. Kingsbury, Mayor of Blackpool, stated that the Corporation's undertakings included gas supply, electric lighting, &c. The gas-works had been established for upwards of forty years. The capital was £144,000; there was an accumulated sinking fund of £26,000; and the income during the forty years had been equivalent to the present capital five times over—namely, £728,000. The gross profit was £214,000, equalling 1½ times the capital; and there was a net profit practically equivalent to the capital employed. The Corporation had much reduced the price of gas, and had improved their plant very materially. They had devoted a certain amount of profit to the relief of the rates. In 1864, the price was 5s. 10d. per 1000 cubic feet; while at present it was 2s. 4d. They were not thinking of making any increase in the price. The gas consumers numbered 9994, or over one in every five of the inhabitants. The average annual net profit from the works had been less than 8 per cent. To the working classes the Corporation supplied slot-meters; and to the public they supplied burners free. They also supplied "grillers" free to working people. The public lighting, which was very well managed, was carried out at practically cost price. Mr. Livesey, at the last sitting of the Committee, made a number of statements which were not quite accurate. He had spoken of continuity in control being an essential to successful management, and had said that continuity did not exist with corporations, whereas it did with companies. His (witness's) experience was that the same continuity, practically, that was obtained in a company existed in municipal life. Certain men laid themselves out to become specially efficient in particular departments. In Blackpool, for instance, there were men who had been members of the Gas Committee for ten or twenty years. It was quite a common thing throughout the country for a man to remain chairman of the same committee for many years. Mr. Livesey had also said that the companies could beat the corporations in regard to the price of gas. Other witnesses had, however, refuted this statement, and had shown that the price of corporation gas throughout the country was some 2d. per 1000 cubic feet less than that of company gas. Asked to speak as to the Blackpool electric lighting works, witness said that they had been established for some seven years. The capital was £117,000; and there was an accumulated sinking fund of over £9000. The income in the seven years had been £74,000, the gross profit £28,000, and the net profit £6200. The average net profit had been 1 per cent. of the outlay. The street lamps were supplied at cost price; the meters being free. In 1894, the Corporation started with some 56 customers; and the price was 6d. per unit. Now there were over 900 customers; and the price varied from 7d. to 2d. per unit. The customers numbered one in fifty of the population, and one in ten of the inhabited houses. In Blackpool, there were no manufactures; but some small works—such as printing establishments—were supplied with electric power. Asked whether he had anything to say to the suggestion that the fact of the Corporation having gas-works of their own had hampered electrical development, witness replied that he could give a negative to that at once. The Corporation owned both undertakings. There was friendly rivalry between them; and, so far from hampering, one stimulated the other. He thought the public greatly benefited from having the two concerns in the same hands. His was the first borough in the country to adopt public electric lighting. Though they only secured the Order for the domestic supply seven years ago, their streets had been lighted by electricity longer than those of any other town in England.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, July 18.

(*Before Mr. Justice* BUCKLEY.)

In re Kern's Patent No. 294 of 1897.

This case, which occupied his Lordship from the 29th ult. to the 9th inst. (see *ante*, pp. 34, 96), was in the paper to-day for judgment. On its being called,

Mr. MOULTON, for the Welsbach Company, said he was glad to announce that in this matter, as well as in the patent action which had been fixed for the 23rd inst. (*The Welsbach Incandescent Gaslight Company, Limited, v. The New Sunlight Incandescent Company, Limited*), the parties had come to terms. These were actually drawn up and signed, but they required the sanction of the shareholders; and the meeting could not be held before the 27th. Under these circumstances, he asked that the case should stand over formally to Monday, the 30th inst.

Justice BUCKLEY: Do I understand that the proposed settlement will put an end to further litigation?

Mr. MOULTON said it would put an end to both actions. It was proposed that the patent action should stand over generally, and that relating to Kern's patent until the 30th.

His LORDSHIP assented.

Steam Road-Roller Damages at Denbigh.

In the Denbigh County Court last Tuesday, before his Honour Judge Sir Horatio Lloyd, the Denbigh Water Company sued the Town Council of Denbigh for £13 2s. 1d. damages alleged to have been done to the Company's pipes by the steam-roller recently purchased by the Corporation. The Denbigh Gas Company sued the Council for £11 1s. 3d., alleged damage caused in the same way to their pipes. Both Companies also claimed an injunction. The Water Company's case was gone into first. Evidence was given by a waterman in the employ of the Company, who said that he had noticed fractures of the main pipes in certain streets, in all of which the defendant's steam-roller, which weighs 12 tons, had been working a few days previously. The pipes were laid at a depth of from 16 to 23 inches. Mr. F. Storr, the Secretary and Engineer of the Wrexham Water Company, said that the pipes were very good—much better, in fact, than most pipes now manufactured. There were marks of oxidation; but that did not in any material degree weaken the pipes. In all cases of frost, pipes would be split longitudinally; but in the pipes broken, as alleged, by the external pressure of the steam-roller all the fractures were transverse. In cross-examination, Mr. Storr said that 14 inches or even 18 inches was not deep enough to lay pipes, in a town of the size of Denbigh. Mr. M'Donald Gaskin gave evidence as to the difference between fractures caused by external and internal pressure. He said that the pipes of the Denbigh Water Company were excellent, and better even than those manufactured now, even after being in the earth since 1864. In that year, 24 inches was deep enough for the traffic of the time; but now he would not be satisfied with less than 2ft. 6in. or 3ft. It depended on the amount of traffic. Mr. Evan Evans, the County Surveyor of Carnarvon, also gave evidence as to the effect of encrustation on the strength of pipes, and said that it did not weaken their power to resist pressure. Mr. Roberts stated, before closing his case for the Company, that his clients would abandon their demand for an injunction. Mr. Bankes, for the defendants, said that the serious case he was called upon to answer had gone—namely, the injunction. But he had further to contend that it was not proved that the steam-roller had been anywhere near the places mentioned. He had to plead: (1) That the Council were not liable under the Public Authorities Act, (2) that the steam-roller had not caused the damage, (3) that the pipes had not been properly laid, (4) that the pipes had not been laid at a proper depth, and (5) that transverse breakages had occurred long before the steam-roller had come to the town. Mr. Enfield Taylor, of Chester (called as a witness), said that he agreed with the expert witnesses on the other side that the pipes were made of good iron, but they had not been cast so well as pipes were now cast. They were not of uniform strength. The depth of the pipes was far from being adequate; and he thought breakages could occur, and probably did occur, from pressure from railway and other lurries. He produced a piece of pipe which had one part of it ¼ inch thick, and another part ½ inch. He thought that the Company should have re laid their pipes in sections, and not have left them in the ground for 36 years. His Honour took time to consider his judgment; and the case of the Gas Company against the Corporation was adjourned.

A Water-Rate Collector at Neath Convicted of Embezzlement.

Last Wednesday, at the Neath County Police Court, Frederick John Snow, for twelve years collector of water-rates at Neath, was brought up in custody and charged with embezzling certain sums of money belonging to his employers, the Neath Corporation. The prosecution proved that the prisoner went to his own printers and had books printed for the purpose of carrying out his nefarious schemes, which enabled him to make applications to consumers for payment of water-rates, and give receipts. The prisoner paid the printer for the books; whereas the official books formed part of a contract, and were paid for by the Corporation. The prisoner, like the Manager (Mr. Edwin C. Pole), had been taken over by the Corporation when they purchased the water undertaking in 1894. The frauds were discovered in April of this year, and Snow was suspended. A long and laborious investigation had taken place; but even after his suspension Snow had continued his malpractices. The frauds were discovered through an application being made by the Manager for payment of a water-rate. Snow, at first, had protested his innocence, but subsequently he had admitted his guilt, and had written out a list of cases in which he had committed frauds—in the aggregate to the amount of £254. A sentence of six months' hard labour was passed.

Charge of Stealing Water.

At the Stratford Police Court, last Thursday, John Holland, builder, of Chadwick Road, Walwood Park, Leytonstone, appeared to answer an adjourned summons charging him with stealing about 900,000 gallons of water, valued at £45, the property of the East London Water Company. Mr. A. Gill and Mr. G. Kebbell prosecuted; Mr. Purcell defended the accused. On behalf of the Company, it was alleged that the defendant attached a ½-inch lead pipe, capable of discharging 240 gallons of water per hour, to the domestic water supply of No. 8, Preston Road, Walwood Park, and that his workmen used the water from this source for building operations—drawing it through a pit, which had been dug for collecting the surface water, and in which the end of the pipe was laid. For the defence it was contended that there was no theft, and no intention to steal the water. The defendant had applied to the Company, and on two occasions had obtained a building supply; but subsequently they increased their charges to such an extent that he resolved to dig a well and collect the surface water. He did so, and found a supply which he used. In the course of the excavations, however, some of his men came across a buried pipe which was connected with the domestic supply of the above-named house. Thinking this was an old building supply which had been overlooked, the defendant ordered his men on no account to employ the water for building; but, at their request, he gave permission for them to use it for drinking instead of having to go to the occupied houses. Witnesses were called to show that, though water was drawn from the Company's pipe by the workmen, it was for drinking, and not for building purposes. The Bench decided that there was a case to go to a Jury; and the defendant was committed to take his trial at the Central Criminal Court. He was bound over to appear.

MISCELLANEOUS NEWS.

THE LONDON COUNTY COUNCIL AND THE TESTING OF GAS.

The Portable Photometer Again.

The *agenda* for the meeting of the London County Council to-day contains a report by the Public Control Committee on the subject of the testing of gas. The Committee have had under consideration the evidence tendered to the Committee of the House of Commons, and the decision of the Committee rejecting the clauses in the Bill introduced by the Council to legalize the testings, made with the portable photometer, of gas supplied by the three Metropolitan Companies; and they say that the whole of the evidence in support of the Bill given by the Council's Chemist (Dr. Clowes) and the expert witnesses was "based on work actually done, and not on mere opinion," and was, they consider, "in no way disproved by the witnesses called by the three Gas Companies in opposition to the Bill." Dr. Clowes has, at their suggestion, consulted the Gas Referees, and he understands that, in their opinion, it is most desirable that the testings with the portable apparatus should be continued, as the Referees agree with the Public Control Committee that the information obtained will be most valuable for future use. The Committee summarize the evidence given upon their Bill, and then say:

Having regard to the whole of the evidence laid before the Committee of the House of Commons, we think it is clear (1) that the illuminating power of the gas, even in many of the trunk mains, is not equal to that found at the fixed testing-places; and (2) that consumers are largely supplied with gas of much lower illuminating power than that tested at the fixed testing-places.

In reviewing all the facts in connection with the consideration of the Council's Gas Bill, we are much surprised at its rejection, and we are of opinion that the question of obtaining further protection to the gas consumer should not be dropped, but that some means should be found which would more completely assure to the consumers of gas that they are receiving what they pay for, and what the tests at the prescribed testing-places would at first sight appear to indicate they are actually obtaining. In order that the Council may have the latest complete year's results of the testings made with the portable photometer before them, we submit a return showing the results for the year ended March 31, 1900, as follows:—

(*a*) Number of Tests. (*b*) Percentage of the Whole (approximate).

Tests Showing Illuminating Power of the Gas to be	Gaslight and Coke Company.		South Metropolitan Gas Company.		Commercial Gas Company.	
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)
Above 16 candles	14	14	None.	..	4	9½
Between 15·5 and 16·0 candles .	17	17	None.	..	4	9½
,, 15 ,, 15·5 ,, .	31	32	3	6	7	17
,, 14 ,, 15·0 ,, .	33	34	24	46	11	26
,, 13 ,, 14·0 ,, .	3	3	22	42	11	26
Below 13 candles	..	..	3	6	5	12
	98		52		42	
			192			

Percentage of number of tests below 16·0 candles = 90½
,, ,, ,, 15·5 ,, = 80

During the inquiry, the opponents to the Council's Bill suggested that it was eminently desirable that Parliament or the Board of Trade should be requested to institute an inquiry into the cause of the persistent differences found in the illuminating power of the gas supplied, according as it was tested in the prescribed stations or at various places with the portable photometer. We consider that it is very desirable that such an inquiry should be made, and we recommend—"That the Council do ask the Board of Trade to institute an inquiry as to the cause of the persistent differences between the results of testing the illuminating power of gas supplied by Gas Companies at prescribed testing-places and of tests made with the portable photometer of identical construction of gas supplied to other buildings in the county."

THE LONDON COUNTY COUNCIL AND THE INCREASED PRICE OF GAS.

At the Weekly Meeting of the London County Council last Tuesday—Mr W. H. Dickinson, the Chairman, presiding—the reports of the General Purposes and Parliamentary Committees, which appeared in the "Journal" last week (pp. 169, 171), on the subject of the increased price of gas in the Metropolis, were presented. The report of the former Committee having been received,

Mr. E. A. Cornwall, Chairman of the Parliamentary Committee, moved the adoption of the following recommendation at the close of their report: "That the Parliamentary Committee be authorized to convene forthwith a conference of representatives of the Corporation of London and the Vestries and District Boards of the Metropolis, with regard to the charges for gas made by the London Gas Companies, and the action which should be taken in the interests of the gas consumers."

Mr. T. A. Organ moved, as an amendment, to add to the recommendation of the Committee, "and with regard to the quality of the gas supplied by these Companies." He said he ventured to think this had something to do with the recommendation, in so far as the price of gas was concerned. It was all very well for them to ask that the price should be reduced; but if the reduction were accompanied by a lowering of quality, the consumer would get very little benefit. This matter had been under the consideration of the Public Control Committee during the past few weeks, and he had taken occasion to look into the matter rather carefully. He found that, so far as the testing of gas was concerned, the official method was that it should be tested at certain fixed stations, and that it should there be of 16-candle power. The result at the stations was all right—they did get gas of 16-candle power, or nearly so. But the Public Control Committee had instituted further tests by the portable photometer. These were taken at various public stations—largely in the Board Schools; and the difference in the results obtained was very remarkable. They found that at the fixed testing-stations the gas was of the quality he had already mentioned—something approaching 16-candle power; but when they came to what he might call hap-hazard tests, of which no notice had been given to the Companies, they found the results varied—they went down to 15, 14, 13, and even 12 candle power. Since 1892, the quality of the gas had steadily fallen off. Various reasons had been advanced for this; but the evidence given before the Special Committee of the House of Commons, who investigated the matter, was very striking indeed. Having called attention to the statements made by Mr. W. J. Dibdin and Dr. Frank Clowes (the former and the present Chemists to the Council) to that Committee, the speaker went on to say the evidence all through showed very clearly that it was possible for the Gas Companies to enrich the gas on certain occasions and for certain purposes, and it would lead him to the opinion—and he believed, if read correctly, it would lead anybody to the opinion—that the Companies could, on special occasions, enrich the gas supplied to the fixed stations for the purpose of obtaining the candle power which it was necessary for them to supply according to Act of Parliament. Mr. Organ read on this point an extract from the proceedings of the Committee while Mr. Dibdin was under examination. Mr. Dibdin was asked if he had found in some cases that a test taken at the works showed a less illuminating power than one taken at the same time at the official testing-place far from the works; and he said he had made numbers of these tests. He was then asked by Mr. Pope: "Do you secretly, from your own conviction, allege that the gas is fraudulently brought up to the requisite test at the testing-place, although before it reaches that spot it is below it? I want to know what it is you allege." Mr. Worsley Taylor said he did not think they were bound to allege anything more than the fact. Mr. Pope asked what inference they drew from the fact. Mr. Worsley Taylor said they stated the facts; it was for the Committee to draw inferences. They said the consumer was entitled to get 16-candle gas, but he did not get it. Mr. Vernon Harcourt was asked: "Is the present system of examinations at the stations as good a security to the public as can be applied at the present time?" He replied that he thought it was not, and it was his opinion that the present testing-stations were not really a guarantee that the gas supplied all over the area would be of the parliamentary standard of 16 candles. Then there was the evidence of Mr. Bellamy, the Lighting Engineer of Liverpool—and, by the way, he might say that the consumers of Liverpool were far better off than those of London, because the gas supplied to the Liverpool consumer was of 20-candle power, and not 16. Mr. Bellamy said that five or six years ago the Liverpool Corporation used the portable photometer, and found that the candle power varied between 16 and 20. Complaints were made to the Liverpool Corporation to such an extent that the Company supplying that city had to give way and permit tests to be taken by the portable photometer. When Mr. Bellamy gave his evidence, he said all the gas supplied to Liverpool was of 20-candle power. The same evidence was given by the chief official for Leeds. And, again, it might be said that it was hardly fair to the Companies to charge them in any way with fraud in this particular matter; but he would put it to the Council, if there was no special reason on the part of the Companies why this method of test should not be employed rather than fixed stations, why should the Companies employ expensive Counsel to oppose the Council's Gas-Testing Bill, which was for the purpose of having this particular test introduced. He hoped that the Council would see fit to include his amendment, so that this question might be raised; for he felt certain that, in considering the question of price, the conference should consider the question of quality too.

Mr. Nathan Robinson, in seconding the amendment, thought the Council ought to be very much obliged to Mr. Organ for the very pertinent manner in which he had placed this case before the Council. He held in his hand a letter from Dr. Clowes, in which he said: "The percentage of the tests in illuminating power, as taken by the portable photometer during 1899, which were below the standard of 16 candles, was 90." He, with Mr. Organ, thought that if the Companies had the power to tax the general public to such an enormous extent, the Council ought to have the power of compelling them to supply an article worthy of the price they charged. He had no desire whatever to receive a writ for libel; but he was prepared to say that if this was done by private persons, if he was one of the sufferers he would very likely tell the person so supplying him that he had been guilty of fraud. Of course, he did not say this with reference to the Gas Companies; but he did say that it was quite time they were compelled to put their house in order, and supply the public with an article that they dearly paid for.

Dr. Collins remarked that they seemed to have arrived at one of those periodical occasions on which the gas consumer of London began to realize—and realize more acutely than usual—the grievance under which he suffered at the hands of the Gas Companies. Many councillors interested in archæological research, if they looked through the minutes of the late Metropolitan Board of Works, would find that on periodical occasions this matter of the relationship between the gas consumer and those who presumed to speak in the public interest on a matter of such supreme importance, had come up for solution; and they must remember that the sliding-scale, which had been discussed by the Comptroller in the very able report which was presented by the General Purposes Committee, was looked upon some twenty or thirty years ago as being an escape from two other alternatives which were then suggested, not only by the Metropolitan Board of Works, but also by the Corporation of the City of London. On that occasion, Bills were introduced into Parliament for the acquisition of the Gas Companies' undertakings; and another Bill also was introduced for an independent supply of gas by the Municipal Authority. The sliding-scale, which was now found not to work so well in the interests of the consumer as it did in the interests of the shareholder, was looked upon as an alternative scheme. The exhaustive report which the Comptroller had placed before the General Purposes Committee, and which the General Purposes Committee placed before the Council, showed, at any rate, that the sliding-scale had not worked so advantageously to the consumer as was originally hoped, and appeared

to be working more disadvantageously as time went on. He gathered from the figures that the consumers' share of the burden had increased. In 1876, it was 82·3 per cent.; and in 1898 it was 85·5 per cent. The Companies' share had decreased from 17·7 per cent. in 1876, to 14·5 per cent. in 1898. And it was stated in the report that it would seem that the result of this increase of 6d. per 1000 cubic feet would be a tax on the consumers of gas of no less than £788,942 a year, while the shareholders of the Companies would only suffer to the extent of £141,247. The Companies stated that, in accordance with their Acts of Parliament, the effect of this addition to the price of gas upon the dividend was a corresponding reduction in the rate payable, as from the 1st of January last. If Councillors would look at the large figures which were before them on the authority of the Comptroller, they would see that the correspondence was of a somewhat disproportionate character, and that the burden was borne more by the consumer than by the shareholder. He entirely sympathized with, and supported, the amendment moved by Mr. Organ, because when he was Chairman of the Public Control Committee he made himself conversant, not only with the figures to which he had called attention as to the enrichment of the gas being remarkably successful in the neighbourhood of the testing-stations and remarkably unsuccessful in the case of the consumer himself, but he also made himself familiar with the portable photometer; and he had no doubt whatever that the portable photometer test was a thoroughly fair and satisfactory one. It was a great misfortune that Parliament had not seen fit to give the test by the portable photometer legal sanction. All his experience in the matter led him to the opinion that one was being baffled by a vast deal of company-made law which, in the interests of consumers, had a most shocking effect.

Mr. B. S. Straus remarked that there was a great deal he wanted to say; but Dr. Collins had already said it in a very much more able manner than he would have been able to do. He would, however, like to say that Mr. Nathan Robinson seemed rather shy of offending or slandering the Companies. He was not a bit afraid of slandering the Companies. He thought, when one read the notice the Gaslight and Coke Company were sending out to those people who had to use the very inadequate quality of stuff that they were supplying, that it was absolutely a case of obtaining money under false pretences. It was conclusively proved by the report on the *agenda* that the Gas Companies of London were getting a profit of considerably over half-a-million, simply because coals had gone up. He meant their net profit would be over half-a-million; and yet they said that this was corresponding to the reduction to the ratepayer. Surely, if it was not an absolute concrete case of hoodwinking the public, this little paper would certainly suggest to anybody that the Companies were making nothing out of this extra cost of gas, but it was simply the extra cost they had to pay for the coal. On the report they had, it was absolutely untrue; and consequently he said it was a scandalous shame that they, at the end of the nineteenth century, had to put up with this kind of monopoly, which was simply proving conclusively every day they looked at it, how very much against the interests it was of the Metropolis, and the vast population who lived in the Metropolis. If it was necessary for gas companies to put up their prices on account of the war in South Africa, how was it that electric lighting companies did not suggest that they had to put up their prices, and were still paying very good dividends? Why should the Gaslight and Coke Company put up their prices while the Westminster Electric Lighting Company recently reduced their rate instead of increasing it? He hoped they would no longer submit to be hoodwinked by a Company who had always been badly managed. As long as there was a monopoly in the gas interests, they would be served badly. He said it was high time that the Council should take the matter in hand, and try to do something for those who simply paid the rates and got a notice of this kind, which led them to believe that the additional charge was to pay for the extra price of coal, which was absolutely and entirely untrue.

The Right Hon. J. G. Shaw-Lefevre entirely agreed with the observations made by Dr. Collins with regard to the past action of Parliament, especially in respect to the sliding-scale. The sliding-scale was adopted in 1875, after very long agitation on the part of the consumers of gas in London, and after a long course of legislation on the part of the Metropolitan Board of Works and the Vestries; and it was adopted with the object and the hope that it would offer great inducement to the Companies so to manage their concerns that the price of gas would be largely reduced. It was certainly a very serious matter that, in consequence of the very great rise in the cost of coal, the price of gas had now to be increased so largely, and a very little burden cast upon the shareholders of the Company, compared with the great burden which would fall upon the consumers. He did not, for his part, quite understand why the price of coal should have risen to the extent it had. He believed he was right in saying that the production of coal during the past year had been very much larger than ever before, and that in the year 1899 no less than 220 million tons of coal were produced in this country—namely, 20 million tons more than in any previous year. Why, in the face of this, there should have been a very large amount of rise in the price of coal, he could not quite understand. He could not but feel that, whatever the cause, it was undoubtedly the fact that the Gas Companies had been obliged to make contracts at a very much higher price. The question was whether, by care and good management of their concerns, they might not save a great deal of the extra cost which was thus thrown upon the public. He himself was a member of a Committee, which was presided over by Lord Cardwell, on the gas question so long ago as the year 1867; and very much the same complaints were then made—namely, that the Gas Companies were mismanaging their concerns, and that the gas was charged for at a very much higher rate than was justifiable. All these complaints were before the Committee; and the Committee then came to the conclusion that they were justified. At the same time, the Committee felt that they were not justified according to the practice of Parliament in forcing upon the Companies a new scale of prices. This was contrary to the tradition and practice of Parliament. But they also came to the conclusion that there was nothing to prevent the Metropolitan Board of Works, or any other Local Authority of London, establishing competing works against the Companies. And he should like to call the attention of the Council to what the Committee reported on that occasion. He might mention the fact that the Committee recommended to the Companies a particular scale of prices very much lower than they were then charging; and when the Companies refused to adopt the scale, the Committee themselves recommended that there should be competition on the part of the Metropolitan Board of Works. They said: "The difficulty with which your Committee have had to contend will be found to apply to every General Bill which may be introduced without the concurrence of the Companies for the regulation of their present monopoly. But it will always be in the power of Parliament to prescribe terms of regulation as each Company comes before it to apply for new powers; and the necessity for such powers has usually brought the Companies to Parliament at no long intervals of time. Your Committee, however, do not think it would be just to the consumer to leave him to the casualties of this mode of remedy, and they recommend that, if the Companies decline to submit to general regulations such as Parliament may consider reasonable, measures should be taken for the introduction of a new supply in independent hands." The position at the present moment was very much the same as that mentioned in 1867. They had the report of the Committee of the House of Commons affirming the fact that the Gaslight and Coke Company had not conducted their business with due care and good management, and they had recommended a reduction in their scale of charges as reasonable and right. Well, so far, the Company had not adopted the new scale, and he believed they were anxious, if possible, to avoid coming to Parliament for raising fresh capital. He would advise the Committee who were to deal with this matter to carefully study the report of the Committee of 1867, and to consider whether it might not be right and wise, in the interests of the consumers of London, to bring in a Bill next session to sanction the establishment of a competing supply, at all events for the purpose of using it as a weapon against the Company, so as to enforce them to reduce their price. He thought it was monstrous, looking to the enormous increase which would be thrown upon the consumers, that the Companies should bear so small a portion of the burden; and he could only hope—that was the way in which he put it—that some remedy might afterwards be found.

Earl Carrington said the report told the Council that the three Gas Companies paid 11, 12¼, and 11¼ per cent. His own position was this: He found he was paying 3s. 5d. for 1000 cubic feet for gas for his house leading out of Grosvenor Square. What he thought he had a right to complain of was that the Company who charged him this price charged the penny-in-the-slot people 4s. 2d. per 1000 cubic feet, or 9d. more. These consumers were described by the officials of the Company as the people living in artisans' dwellings, and the very poor. A high authority in the House of Commons had told them that they could not criticize an evil, they could only describe it. He did not presume to criticize the conduct of this Company; he thought it only needed description.

Mr. B. L. Cohen, M.P., thought perhaps the Council would allow him to say a few words, because it was on his motion in the House of Commons that the Committee was appointed to which reference had been made. He believed those who were familiar with the subject knew that he at least did not approach the question with any prepossession in favour of the Gaslight and Coke Company. It was impossible to follow the protracted, and he thought very diligent, inquiry held last year without coming to the conviction at which they unanimously arrived—that that Company, as distinguished from the Commercial and the South Metropolitan Companies, had not conducted their business with that care and good management which was a condition precedent to the sanctioning of the sliding-scale in 1867, and on the faith of which it had been granted. So far, therefore, the Gaslight and Coke Company came out with a bad record before the House of Commons Committee last year. But he did think the interests of the Council, and he was quite sure the case of the consumers, was not advanced by using violent language. It could not appeal to any, except a few members of the Council; and such expressions as "obtaining money by false pretences," and all that kind of thing, was, if his honourable friend opposite would forgive him for saying so, claptrap nonsense. He said this most distinctly, because the Gaslight and Coke Company, with whom he had not a shred of sympathy, had not levied, or, as far as he knew, tried to levy, anything which was not in strict conformity with the law of the land. Be it good or be it bad, they were entitled to it. He hoped the Legislature would vary their powers; but until they were varied, the Directors of the Company could not be blamed for pursuing the only course open to them if they consulted the interests of their shareholders, who had returned them to their positions. If it had not been that it was established, he thought conclusively, before the Committee of last year, that the Gaslight and Coke Company, alone of the three Companies indicted, had not managed their business with that care and economy which Parliament had a right to expect, he very much questioned whether the House of Commons would have felt justified in advising Parliament to vary the sliding-scale, on the faith of which many millions of capital had been subscribed. But when parties to a contract had failed to carry out one of its essential conditions, then—and, in his opinion, only then—was the case made out for varying the terms on which public money had been subscribed by the shareholders. Now they came to the great advance in the price of gas which had been announced by the Gaslight and Coke Company. There, again, he hoped he should be acquitted of any sympathy with the Company (who, he was quite certain, would charge him with being their opponent) when he said that, of all the mismanagement of which they had been proved to be guilty, the one thing for which he thought but little reproach could be brought against them was in the extra charge of 6d. consequent upon the advance in the price of coal. He said this because a similar advance had been made by the Commercial Company, and the South Metropolitan Company—whose record, so far as his knowledge went, was beyond suspicion—had gone higher. But he also said it because of the figures given in the Comptroller's report. It was true he had compared figures which Dr. Collins was not slow to seize, and which were a little bit captivating, when he said: "It will be seen that the result will be a tax on the consumers of gas amounting to no less than £788,942 a year, while the shareholders of the Companies will only suffer to the extent of £141,247." He said this was comparing or contrasting two figures which were not comparable. The amounts which the gas consumer had to pay as the extra price of gas could not go, would not go, *ex hypothesi* into the shareholders' pockets; and this £788,942 which would have to be raised from the consumers of the Gaslight and Coke Company's district was surely not a comparable figure, when it was found that the extra cost of coal to the Company, at an advance of 8s. per ton, came to £795,000, which, as nearly as possible was identical with

the amount of extra money which they would raise from the consumers. As he had said, he was not there to defend the Company—his desire would indeed much rather be to hold a brief for the prosecution; but he did not want to be unjust towards them. He wanted figures to be placed before the public which were comparable, and to have the Company convicted on evidence which he considered strictly justified their condemnation, and not on any other.

Mr. R. Melvill Beachcroft thought it only fair to say, after most of the speeches on the subject—many of them on the Progressive side—that the proposal laid before them by the Parliamentary Committee had resulted from a motion of his in the Parliamentary Committee on the previous Thursday. The history of gas supply in London was really one of perpetual agitation followed by legislation. In 1873, the Metropolitan Board of Works joined hands with the Corporation of London and made application to Parliament; and he hoped that now, in 1900, the present Corporation might co-operate with the London County Council, and see whether something could not be done to recognize this undoubtedly most unsatisfactory state of affairs. For forty years prior to 1876, the Gas Companies proceeded on what was known as a fixed scale; but in 1867 the sliding-scale arrangement took its place, and it might be (for his part, he was not satisfied, after reading the Comptroller's report, that it was not so) that this arrangement was a wrong one. On the other hand, it might be that it was the best one. But, at any rate, he would be only too glad to see Parliament intervene in order to place the gas consumer in a more satisfactory position. He represented a district—Clerkenwell—where the gas question was a most serious one, as it was also in Holborn and other parts of the North of London. It affected in a large degree those workers who were dependent on gas for their means of support. He suggested that they should, if possible, be unanimous. Let them go as a united body, resolved that this state of things should be put an end to; and if they could now get the Corporation of London to join hands with them, as they did with the Metropolitan Board of Works in 1873, he was satisfied that some solution of the question would be arrived at.

Mr. E. A. Cornwall remarked that the amendment which Mr. Organ had moved was an addition to what the Parliamentary Committee proposed in reference to the matter which would come before the conference of Local Authorities, if the Council agreed to authorize the Parliamentary Committee to convene one. Of course, speaking for the Parliamentary Committee, he had no objection whatever to adding the words suggested—in fact, he thought they were a very useful addition, and would enable the conference to deal with the matter in a larger way than perhaps would have been possible under the limited recommendation which his Committee had brought up. Since they had had a discussion in the Council, perhaps he might be allowed to mention very shortly what had taken place on the question of what had been done by the Council in relation to the Local Authorities and to the various Bills before Parliament. Some two years ago, the Gaslight and Coke Company took a very serious step, which the people of London in Parliament ought to have resisted more than they did. The Council opposed the Company's Bill; but it passed through Parliament. This Bill was to convert their capital from £11,000,000 to £25,000,000, making what was 10 or 11 per cent. on their £11,000,000 about 5 per cent. on the converted capital of £25,000,000. This would have been the real occasion, if Parliament had only listened to what the London County Council put before them, on which to have brought the Gas Companies to book. The Bill passed; and the Companies now said they only got a small dividend. Last year the Gaslight and Coke Company applied to Parliament for £2,500,000 of new capital. The Council opposed the Bill, and it was fortunately rejected. He thought it was rejected very much in consequence of what the Select Committee, who had been sitting in reference to the high prices then charged by the Gas Companies, reported. His colleague, Mr. Cohen, was perfectly entitled to say that he secured the appointment of the Committee. He thought they were under a considerable debt of gratitude to him for the part he took when the Committee was appointed, because of the then high prices charged by the Gaslight and Coke Company. He did not know what the Committee would have said had they been appointed to consider the much higher prices the Company were charging now. However, the Bill for further capital was rejected last year. Again this year the Company introduced another Bill to authorize them to raise further capital. With the opposition of the Council and the Local Authorities, the Bill was again rejected; Parliament being told what the conclusion the Select Committee came to last year was—that the high price charged then by the Gaslight and Coke Company was very much due to the mismanagement of their undertaking. When the question of the Gaslight and Coke Company and their charges was before the Select Committee last year, the Parliamentary Committee of the County Council were charged with getting up evidence to place before that Committee. They felt that it was their duty to confer with representatives of the Local Authorities, so that the evidence given might be in accord with the views, not only of the Council, but of the Local Authorities north of the Thames. The Parliamentary Committee thought that, in view of the steps which must be taken by the Council in the near future in regard to the Gaslight and Coke Company, it was desirable that they should again confer with the Local Authorities before deciding what course they should adopt. He might mention that the Company, failing to get new capital powers, had agreed a few days ago to accept a price from the South Metropolitan Gas Company for the portion of their undertaking south of the Thames. The Parliamentary Committee were led to believe that they only agreed to the figure offered by the South Metropolitan Gas Company because they were very anxious to get the money, as they could not obtain more capital from Parliament. The Council opposed the sale, unless they would incorporate some condition as to the price the Company should charge for gas north of the Thames; and they succeeded in getting the proposal rejected. It was pretty evident that the Gaslight and Coke Company must next year again go to Parliament; and it was also evident, from the report of the Select Committee last year, that the Select Committee were of opinion that, when the Gas Company did go to Parliament for further concessions, that was the time for re-arrangements to be made as to their powers. It was almost certain that, as the Company failed to get their capital the last two years, and as they failed to secure the money which they would have received by the sale of their district south of the Thames to the South Metropolitan Gas Company, the Council would have an opportunity next year of asking Parliament to deal with the Company. That was why they thought a conference should be convened by the Council, so that the City Corporation and the other Local Authorities, and the London County Council, should be united in any course they might take. In reference to the actual wording of the amendment, "as to the quality of the gas," the Council would remember that they promoted a Bill to enable them to apply a portable photometer to gas testing; and after the Bill had been before a Committee of the House of Commons for ten days, unfortunately it was rejected. He did not want to repeat there what took place in that Committee; but it was not so hopeful to the Council as they should have liked it to have been. He might, however, say, as having been present on most of the occasions when the Committee were sitting, that this was not due to any want of energy or ability on the part of their officers, who stated the case for London and the Council, in his opinion and humble judgment, in a most able and competent manner; and he was in hopes that, after having listened to it, the result of the Committee would have been more satisfactory. As they knew, the merits of the case were as strong as ever. He entirely agreed with what Mr. Organ and Dr. Collins had said; he did not know that the opinion of the Council had in any way varied on the point. He was quite willing to accept the amendment which would include in the conference, when it was held, consideration as to the quality of the gas as well as the price charged by the Gaslight and Coke Company.

Mr. W. Pearce said there was one fact he should like to bring before the notice of the Council. He did not think it appeared in the report. It bore very largely on what the sliding-scale ought to be—that was, the cost to-day of the production and distribution of gas. The facts could very easily be obtained; and he was convinced that, if they were obtained, the cost of the manufacture and distribution of gas in London would appear to be less than 2s. per 1000 cubic feet. This being so, any sliding-scale based on an initial figure up to 3s. 3d. proposed now, or on the old scale of 3s. 6d. to 3s. 9d., was bound to be an enormous disadvantage to the consumer; and he did think that those who had this question in hand should fix their attention sternly on the initial price of 2s., and get all the information they could. He was sure what he had said would prove to be true—that the cost price to the Gas Company of the article they were selling to the public was well under 2s. If they were able to make a bargain and establish 3s. 3d. as the initial figure they could pay dividends on, they would place themselves in a position exceedingly disadvantageous to the consumer.

On a show of hands, the amendment was adopted.

Mr. Taylor moved a further amendment. He did not wish to make a speech about it, as he was sure every member of the Council would admit the amendment to be very necessary. It was to add the following words to Mr. Organ's amendment: "and also with regard to the quantity supplied by their meters." He moved this amendment—which he hoped would be in order—in the interests of many thousands of working-class consumers especially, who were now using gas by means of the penny-in-the-slot system. He had received many complaints with regard to the quantity supplied; and it did seem to him that, if they held a butcher, a baker, a greengrocer, or a publican, responsible for his weights and measures, the Gas Companies should be brought under exactly the same law. Now, as a matter of fact, there was a very big difference between a Gas Company and a small tradesman. The consumer had to pay the charges that were levied by the Gas Companies; they might increase them, and the consumer had no means of knowing, by looking at the meter, what the quantity of gas supplied was. It could only be discovered by there being a very big difference in the bill for one quarter as against another. Then, if the consumer complained, the Gas Companies sent down and had the meter disconnected; and the consumer had to send it to be tested at his own cost.

A Councillor: No.

Mr. Taylor happened to have had to pay himself, so he was speaking of what he knew something about. The Gas Company disconnected the meter. He had to send the meter away at his own cost to be tested; and it was returned as not passing gas. The fact remained that the meter was either injured by the Gas Company's officials in disconnecting it, or in transit to the gas-testing station; but, any how, he had nothing to do but to pay the charges that were levied. This was only one instance. There were thousands who had practically the same thing to put up with. At one time, when the penny-in-the-slot meters were first introduced, any consumer could read the meter and see whether he got his 25, 27, or 29 cubic feet for a penny; but now he found that the Gas Companies were introducing new meters by which the consumer could not read the amount of gas that he consumed, or that he received for his penny. Under these circumstances, he did hope the Council would pass the amendment, so as to bring the Gas Companies in some way under the Weights and Measures Acts which applied to other trades and people.

Mr. Dew seconded the addition.

The Chairman put the further amendment, and it was adopted.

The recommendation of the Parliamentary Committee, as amended, was then put to the Council, and unanimously agreed to.

Starting the New Gasholder at Maidstone.—The ceremony of laying the foundation stone of the new gasholder which is being built on land adjoining the Maidstone Gas Company's works in St. Peter Street was performed last Tuesday by Mr. George Marsham. There were several of the Directors of the Company present, as well as Mr. Henry Smythe, the Manager. Mr. Marsham was presented with a silver trowel by the contractor; and a luncheon in the Company's board-room at the works followed.

The Alcester District Council Threaten the Water Company.—At a meeting of the Alcester District Council last Wednesday, the question of the inefficiency of the water supply was considered. It resulted in the Clerk being directed to write to the Water Company to the effect that, unless they agreed to the Council acquiring their works at the market value, the Council would avail themselves of the provisions of the Public Health Acts to provide Alcester with an adequate supply of water from another source—the Council being unable to tolerate the constant complaints received as to the supply.

PREPAYMENT METERS.

CHANGING PRICE.
MOST SIMPLE.
NO WHEELS OR
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THIS METER CAN BE ALTERED *in situ.*

INSTRUCTIONS.

The Brass Plate has holes around its edge, numbered; these indicate the feet delivered for the Coin used.
To set the Meter, note Figs. I., II., III., IV.

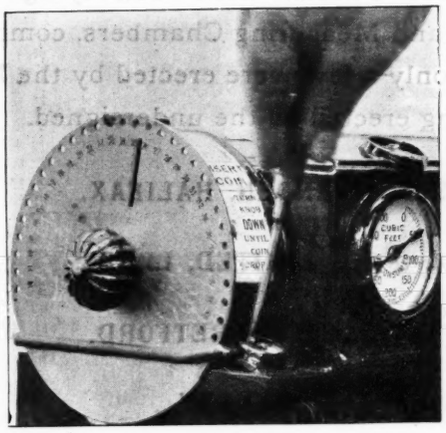

Fig. I.
Break Company's Seal and Remove Screw—THUS.

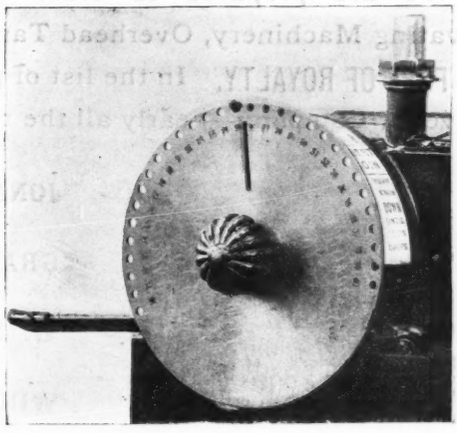

Fig. II.
Swing Band Back—THUS.

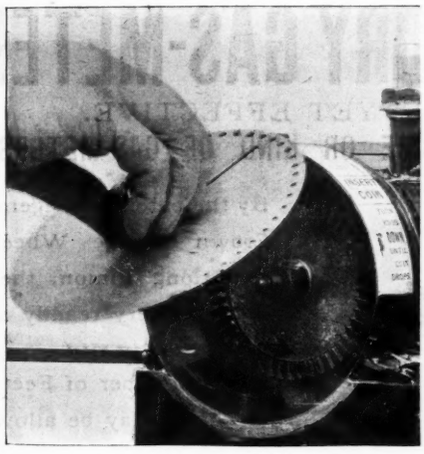

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

Swing Band Forward—Replace Screw—and Re seal.

NOTHING SO EASY. NOTHING SO ACCURATE.

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A "NEEDFUL" EXPLANATION.

We note an Advertisement in the "JOURNAL," under the name of the NEW CONVEYOR COMPANY, stating that they had taken over the business of the AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED; and, as it may create a false impression, we beg to say there are **NO VALID PATENTS** existing in connection with Inclined Retorts (beyond a few small and subsidiary ones, dealing with details).

We are prepared to erect Inclined Retort Plants, with Conveying and Elevating Machinery, Overhead Tanks, Hoppers, and Measuring Chambers, complete and **FREE OF ROYALTY.** In the list of places given, only a few were erected by the New Conveyor Company—nearly all the remainder being erected by the undersigned.

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The Attachment is kept as distinct from the Meter as possible, and does not interfere with the ordinary Index of the Meter.

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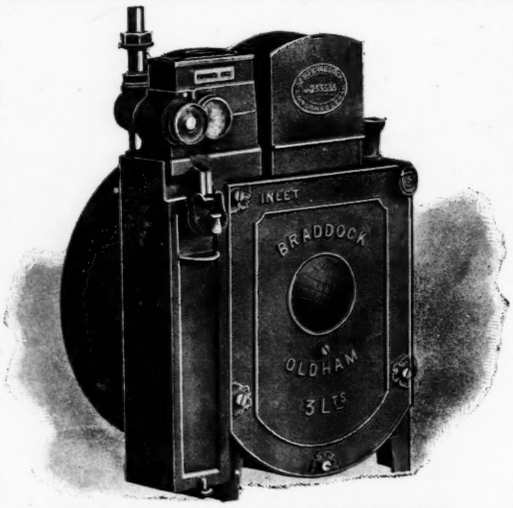

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By the patent arrangement of Crown Change Wheel and fixed long Pinion, the price may be very readily altered *in situ.*

Any number of Feet per Penny may be allowed.

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JUBILEE PRESENTATIONS TO MR. JESSE HALL.

Mr. Jesse Hall, who recently completed his jubilee of service as Manager and Secretary of the St. Andrews Gaslight Company, was last Friday presented with testimonials from former assistants and other friends. The ceremony took place in Mr. Hall's private residence, and the subscribers were represented by Mr. J. W. Carmichael, of Barrhead, Mr. D. M. Nelson, of Glasgow, and Mr. R. S. Carlow, of Arbroath. Mr. T. Douglas Hall and Mr. David Hall (Mr. Hall's sons) were present.

Mr. NELSON, in handing over to Mr. Hall a beautiful illuminated address, referred to his long acquaintanceship and friendship with him, and to Mr. Hall's kindly courtesy, genial friendship, and native modesty. The address set forth as follows:—

A number of former assistants, now managers of gas-works in various towns of the United Kingdom, along with other friends, desire to congratulate you as Secretary and Manager of the St. Andrews Gaslight Company, upon the recent completion of your jubilee of service in that undertaking, and on the faithfulness and efficiency with which such service has been rendered, as manifested by the spontaneous recognition by Directors and shareholders alike during that very long period. These friends regard with pleasure their sense of the good work done by you to further the interests and to promote the happiness of others during a long life of earnest, untiring industry; and they cordially convey at the same time their best wishes for your health, happiness, and prosperity. Signed, on behalf of the friends above referred to, James W. Carmichael, D. M. Nelson, at St. Andrews, this the 20th day of July, 1900.

Mr. CARMICHAEL then asked Mr. Hall to accept as a further token of their appreciation of his worth a handsome easy chair and a set of footstools. Mr. Hall, he remarked, had not eaten the bread of idleness, but had been a very active and busy man all his days, as a slight acquaintance with the many public offices he had filled fully testified. Mr. Carmichael expressed his pleasure at having served his apprenticeship under Mr. Hall, who instilled into him as well as others the high ideal that if a thing was worth doing, it should be done well.

Mr. HALL, in reply, said he felt very grateful for, and proud of, the honour done him, the more so when he considered the source whence that honour came. It was 65 years since he first saw anything connected with a gas-works, and at that time he had not the slightest idea that he would be a gas manager, gas engineer, or architect. He, however, had conducted the St. Andrews Gas Company during the past 50 years with fair success, and had had the confidence of his Directors. He did not think there were at present in St. Andrews half-a-dozen people who were resident in it when he came to the city; but there were associations round about it of which he could not get quit. The work, though hard, had been a pleasure; and it had borne its own fruits. He had been a worker all his days, and they could not force him into a worse position now than to be idle.

Mr. CARLOW, on behalf of the subscribers, presented Miss Hall with a gold and pearl mounted umbrella.

Mr. T. DOUGLAS HALL acknowledged the gift on behalf of his sister.

The company were entertained to luncheon by Mr. Hall.

Among others who have entered the profession under Mr. Hall's tuition may be mentioned Mr. A. MacPherson, Kirkcaldy; Mr. John Swan, Ulverston; Mr. James Carmichael, Barrhead; and Mr. James Auchterlonie, of the Crystal Palace District Gas Company.

FACTORY INSPECTORS AND CARBONIC OXIDE POISONING.

The recently issued report of the Chief Inspector of Factories and Workshops (Dr. Arthur Whitelegge) for the past year contains a memorandum issued by the Home Office on the subject of water gas. The attention of the inspectors is directed to the increasing manufacture of this gas, not only by municipalities and gas companies for purposes of domestic heating and lighting, but also in factories for driving engines, welding, and other purposes. It is pointed out that the Departmental Committee appointed by the Home Secretary, whose report has been fully dealt with in the "JOURNAL," investigated this question from the domestic rather than from the industrial side; and the authors of the memorandum (Drs. Legge and Whitelegge) therefore consider it from the latter standpoint. Having shortly described the method of making water gas and producer gas, they state that the particular danger associated with these gases is that of poisoning by carbonic oxide, which is a constituent of coal gas as well as of water gas. But whereas the proportion in coal gas varies from 4 to 12 per cent., in carburetted water gas it reaches 30 per cent., and in uncarburetted water gas amounts to nearly 50 per cent.; Dowson gas usually containing 25 per cent. The authors go on to say that, though the danger attending the use of these gases is one chiefly affecting persons sleeping in a room in which gas charged with carbonic oxide is escaping, there have been fatal mishaps from this source in factories; and it is highly probable that others, in factories as elsewhere, are not recorded. Fatal poisoning in factories has resulted from cleaning out Dowson tanks before a sufficient time had been allowed for the gas to escape, from repairing faulty connections in pipes containing the gas, and from the gradual escape of the gas into the confined atmosphere of a small engine-room through defective valves in the engine itself. It is pointed out, however, that carbonic oxide poisoning may occur in other ways, without inhalation of water gas or coal gas. In the report for 1897, particulars were given of the death of a man while engaged in repairing a tar-still in Dublin; and in another instance two men lost their lives while repairing a line of tubes in connection with a blast-furnace. Carbonic oxide is found in lime-kilns and where braziers and coke-fires are used in confined spaces. Danger of carbonic oxide poisoning may arise in laundries from the use of gas-irons, and in workrooms from defective gas-fittings and from gas-stoves, especially when no provision is made for the products of combustion to be carried away by a flue or chimney. The absence of a chimney in a room greatly increases the risk.

After dealing with the action of carbonic oxide on the blood, and the examination of the latter, the authors go on to remark that the first symptoms produced by the inhalation of the gas are throbbing of the blood-vessels of the head, giddiness, palpitation of the heart, and weakness of the limbs. These become greatly aggravated after any exertion. Owing to the insidious onset and cumulative effect of the gas, the weakness of the limbs may come on without attracting notice, so that the person affected is unable to make good his escape from the poisonous atmosphere. Headache, anæmia, and defective nutrition have been alleged to result from the long-continued breathing of the gas in amount too small to produce immediate effects, such as might occur from defective gas-fittings in workrooms. The appropriate remedies for poisoning by carbonic oxide are fresh air, artificial respiration, administration of oxygen, and the application of warmth.

The authors say that the precautionary measures to be considered must vary somewhat according to the different manner in which the gas is manufactured and used in one and another factory; but they think the following are of general application: "(1) Notices should be posted up stating the deadly nature of the gas, the symptoms produced by its inhalation, and the best means of rendering aid to those who are 'gassed.' (2) Persons in charge of any engine worked by water gas, or of any apparatus in which it is stored, or otherwise exposed to risk of inhaling carbonic oxide, should be free from any disease of the heart or lungs. Employers would do well to cause such persons to be examined and certified by a medical man. (3) No engine in which water gas is used should be in a confined space. (4) A competent and responsible person should, at stated short intervals, inspect all valves and connections, to see that there is no escape of gas; and a signed record with the dates of such inspections should be kept. (5) The openings giving access to any part of the water-gas circuit should be few, and in positions as safe as possible, and opened only in cases of real need and by responsible persons. (6) No workmen should enter, or approach when opened, the holder or other part of the water-gas circuit until the gas has been well flushed out by fresh air. (7) A cylinder of compressed oxygen, fitted with a piece of rubber gas-tubing and a mouthpiece, should be kept in constant readiness. Such cylinders can be obtained fitted also with a reducing-valve. (8) Medical aid should be summoned immediately; but in view of the importance of losing no time in commencing treatment, the workmen employed should be instructed by a medical man in the manner of administering the oxygen and of performing artificial respiration. They should be especially warned of the danger of exposing the patient to cold."

Respirators are of no avail as a protection against carbonic oxide poisoning. When, for purposes of rescue, it becomes necessary to enter an atmosphere charged with the gas, the rescuer must protect himself by tying a rope securely round his waist, the free end being held by persons outside, or, preferably, by the use of one or other of the special rescue appliances designed for such work. The principle underlying them is that the rescuer is made to breathe air, or a mixture of air and oxygen, which renders him independent of the poisonous atmosphere immediately surrounding him. The authors add that, in towns where the public gas supply is largely charged with water gas, attention to gas-fittings in factories and workshops becomes a matter of increased moment. They close their memorandum with an indication of the notice they think should be posted up near the place where the danger of gas poisoning arises.

GAS AFFAIRS AT BIRMINGHAM.

Cost of Coal and the Price of Gas—Retirement of Mr. Edwin Smith.

At the Meeting to-day (Tuesday) of the Birmingham City Council, the Gas Committee will submit the following recommendations: That the price of gas be increased by 3d. per 1000 cubic feet, with a proportionate increase for public lighting, from the September reading of the meters. That the Committee be authorized to advertise for, and appoint, a Secretary of the gas undertaking, at a salary of £1000 per annum, in the place of Mr. Edwin Smith, who desires to retire early next year under the superannuation scheme. The Committee, in their report, state that they have made contracts for the coal required in the coming year at a considerable advance on the prices of last year. The average price per ton for coal in the coming year will probably greatly exceed that paid in any year since the Corporation have had the administration of the gas undertaking. The Committee have given most careful attention to the question of the provision to be made to meet the very heavy additional cost of the manufacture of gas. While there will be an increased cost of manufacture over the whole year, it will not be possible to increase the price of gas before September; and in the current year the increased prices of gas can only apply to the winter quarters. After taking into consideration the additional sources of income which may be looked for, and which are mainly to be derived from an enhanced value of coke and tar, it appears that, by suspending in the present year the usual provision for depreciation of plant, an increase of at least 5d. per 1000 cubic feet would be required to meet the increased working charges and to maintain the usual balance on the revenue account. The Committee desire, however, in the permanent interests of the department, to avoid, if possible, such an abnormal increase. They fear that it would tend to check the substitution of gas-engines for other forms of motive power which is now in progress on a considerable scale; and it would, moreover, tend to check the use of gas in other directions. In order, therefore, to meet the exceptional circumstances which have arisen, the Committee, having already provided the contribution to the improvement rate for the year 1900 from the profits of the department in the previous year, propose, until they experience more favourable circumstances, to revert to former practice by providing the contribution to the rate for 1901 from the income of the department in that year. In this way, it will be possible to limit, at any rate for the present, the increase in the price of gas to 3d. per 1000 cubic feet.

Concerning the proposed retirement of Mr. Edwin Smith, the "Birmingham Daily Post" mentions that he was originally Secretary to the Midland Institute, and was appointed Secretary of the Gas Department in 1878, on its transference from the old Birmingham Gas Company. Mr. Smith's management of the Gas Department has been characterized by consummate ability; and his relations with the Gas Committee and with the employees of the department have been singularly happy. To him are due various reforms in the administration which have ministered to the convenience of the public and to very large savings of expense. There is no detail of the department which is not at his fingers' ends; and he will be exceedingly difficult to replace.

MANCHESTER CORPORATION GAS SUPPLY.

Annual Report—Extensions at Bradford Road—Re-arrangement of Collectors' Districts, &c.

The annual report of the Manchester Gas Committee has been adopted for presentation to the Council. The quantity of gas transmitted from the works shows an increase of 268,771,000 cubic feet, or 6·03 per cent., as compared with an increase of 303,553,000 cubic feet, or 7·31 per cent., in the previous year. The number of gas consumers on March 31, 1899 and 1900, was respectively as follows: 1900, 126,191; 1899, 118,958. The number of automatic meters in use at the end of the financial year was 31,436, as compared with 26,751 in the previous year. The total amount of revenue was £654,527, as compared with £594,970; being an increase of £59,557. The gross profit on the year's working was £149,051. The net profit amounted to £73,964. Of this amount, £52,000 is paid over to the city fund; £1758 has been placed to suspense account towards the outlay on carburetted water-gas plant; and the balance—£20,206—has been carried to the contingent fund.

At the meeting of the Gas Committee of the Manchester Corporation, held last Friday, plans were approved of for the extensions, including stables and sheds, at the Bradford Road works, necessitated by the prospective increase of business in the carburetted water-gas department. A discussion took place with regard to a suggestion to re-arrange the collectors' districts, owing to the increasing number of accounts to be dealt with; and ultimately changes were made by which there will in future be 33 instead of 30 districts. A resolution was also passed instructing the Finance Committee to borrow £100,000 on gas-works account, out of the recently-sanctioned loan of £250,000.

THE GAS AND WATER ORDERS OF THE PRESENT SESSION.

The Board of Trade have issued further memoranda relating to the Gas and Water Orders of the session. They set forth the nature of the proposals contained in the Orders comprised in the Gas Order Confirmation (No. 2) Bill and the Water Orders Confirmation Bill. The Order in the first-named Bill is to empower the Dungannon Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas within the town of Dungannon (Co. Tyrone). The Orders comprised in the second Bill are to enable the East Surrey Water Company to purchase additional lands by agreement, and to raise more capital; to authorize the South Hayling Water Company, Limited, to raise further capital, and grant an extension of time for the construction of works; to empower the Maidenhead, Sevenoaks, and South-West Suburban Water Companies to raise additional capital, and, in the case of Sevenoaks, to sell the undertaking to the Urban District Council under certain circumstances; and to confer power upon the Tonbridge Water Company, Limited, to construct works, extend their limits of supply, purchase lands by agreement, raise further capital, &c.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended the 30th ult.

Illuminating Power.—The average illuminating power in standard sperm candles at each of the testing-places was as follows:—

The Gaslight and Coke Company—	
Fenchurch Street, E.C.	17·1
Kinghorn Street, Cloth Fair	16 7
Dorset Buildings, Salisbury Square	16·4
Ladbroke Grove, W.	16·5
Vincent Terrace, Islington	17 0
Carlyle Square, S.W.	16·2
Camden Street, N.W.	16 3
Graham Road, Dalston, N.	16·9
Kingsland Road, N.E.	16·7
Vinery Villas, St. John's Wood	16·6
Lambeth Road, S.E.	16·6
Hornsey Road, N.	16·5
Commercial Gas Company—	
Wellclose Square, E.	16·4
Parnell Road, E.	16·6
South Metropolitan Gas Company—	
Hill Street, Peckham	16·7
Bedford Road, S.W.	16·5
Stoney Lane, Tooley Street	16·7
Blackfriars Road, S.E.	16·5
Burrage Road, S.E.	16·6

It will be seen from these results that the average illuminating power at all the testing-stations was higher than the parliamentary standard of 16 candles.

Purity.—Sulphuretted hydrogen was not reported to have been present in the gas on any occasion. The average amount of sulphur in other forms was considerably less than that permitted at all the testing-places of the Companies. Excesses of sulphur were reported by the Official Gas Examiners at the following stations:—

	Grains.
Ladbroke Grove	18·22
Kingsland Road	18·50
Hill Street	17·40
Bedford Road	20·00
Stoney Lane	20·00
Blackfriars Road	17·60
Burrage Road	17·80

The limit allowed is 17 grains per 100 cubic feet.

Ammonia was generally present in the gas throughout the quarter at all the testing-stations, but only in slight quantities. The amount allowed—viz., 4 grains—was not exceeded on any occasion.

STRANGE DEATH AT ASHTON-UNDER-LYNE GAS-WORKS.

An Open Verdict at the Inquest.

Early last Tuesday morning, one of the employees at the Ashton Gas-Works was found dead, under circumstances detailed at the inquest held the following day. Deceased, who was named Edwin Andrew, was seen about 7 o'clock in the new retort-house, engaged in running off water from the hydraulic main. A quarter of an hour afterwards he was found dead, lying on his right side near the engine used for filling the hydraulic main with ammoniacal liquor. It was his duty to start the pump; and he was found lying on the top of a pipe with which the engine was occasionally started.

At the inquest before Mr. J. F. Price, the Coroner, Mr. C. H. Booth watched the case for the Gas Company and supplied the Coroner with a plan of the place where the deceased was found. Mr. Richard Hooton, the Manager of the gas-works, was also in attendance.

Mrs. *Annie Andrew*, the first witness, said the deceased was her husband. He was 27 years of age, and had always had good health. He never complained of anything. He had been about five years at the gas-works, labouring for the stokers. He had never had any fits that she knew of, and he never complained of his head. He had not said anything about the heat being oppressive to him.

Lewis Hall, a stoker at the works, said he last saw deceased alive in the new retort-house at about seven o'clock on Tuesday morning. He was running water off the hydraulic main, and seemed to be all right. He was about 120 yards from where he was afterwards found dead.

W. Samuel Bennett, a labourer at the works, said deceased passed him at half-past six o'clock with a rake in his hand. Between a quarter and twenty minutes past seven o'clock witness was crossing the yard near to the liquor pump, and saw the deceased lying on the ground partly on his right side, and inclined towards his face. He went and looked at him, and seeing there was something amiss ran for the foreman, and afterwards fetched a doctor. He noticed there was a piece of piping under the deceased—he was lying across it. He had at times seen men moving the flywheel of the engine round with the piping, but not the deceased. He had only seen it done when the mortar mill had been going; and he did not believe the mortar mill was working that morning. The deceased's head was towards the mortar mill. When the mortar mill was not working, a man ought to be able to turn the wheel with his hands.

Mr. *Hooton* said the bar was about 7 feet long, and was 1½-inch piping.

Joseph Townsley, yard foreman at the works, said he saw the deceased the previous day about a quarter-past six. It was his duty the first thing every morning to run tar out of the hydraulic main; and to do this, he had to set the liquor pump running. At 20 minutes past seven o'clock witness's attention was called to the deceased by Bennett. He was lying on the ground, 7 feet off the liquor pump, on his right side, inclining towards his face; the largest part of his body being behind the wall at the side of the pump. He turned him on his back, and saw that his face had changed to a darkish blue. He was not bleeding at all. He did not think he was alive. There was a piece of iron piping, 7 feet long, which he was lying on lengthways, not across. The pipe was used sometimes to turn the pump flywheel round when they could not start it by hand. It was not necessary to use it except when the mortar mill was working. After he had examined the deceased, witness looked at the flywheel, and saw that it was going very slowly. The mortar mill was not working at all that morning.

Dr. *F. W. Mann* said he was called in the previous morning about half-past seven o'clock to see the deceased at the gas-works. He was dead. He was bluish in the face, and there was a slight mark on the bridge of his nose and another over the right eye. He had since made a post-mortem examination. Externally there were no other marks of violence, and neither of these was sufficient to cause death. They were superficial. He opened the head, and found there was no fracture or injury to the skull. He removed the skull cap, and a good deal of blood and serum escaped—more than usual in quantity. The membranes were very much congested with venous blood. There were no blood clots in the brain; but the membranes were congested. The heart was empty both on the right and left side; and the right side was a little more fatty than it should have been. The heart was normal, and the valves were not diseased. The lungs were dark like a coalminer's; but there was nothing to cause death. The liver was healthy. The stomach was empty, but normal. The kidneys were both slightly congested, and the spleen also. There was no dislocation of the neck. It was impossible for witness to say whether the deceased had died from a fit or from shock through an injury; but if the latter he should have expected to find some external marks, especially if he had been struck by the piece of piping shown.

After consideration, the Jury (at the suggestion of the Coroner) returned an open verdict.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held on Monday last week, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. J. Blacket Gill in the chair.

The Secretary (Mr. W. Williams) read the notice convening the meeting, and also the following report of the Directors:—

The Directors again have the satisfaction of reporting a steady increase in the business of the Company. At Amiens, the consumption of gas was 10 per cent. more than during the previous year. At Boulogne, there has been an advance of 9½ per cent. in the gas sold, although the amount actually received for rental has been less, owing to the reduction in price, to which reference was made in the last report. At Bolbec, the consumption has been stationary; but the other works—Caen, Havre, Nantes, and Rouen—show an increase of 3 to 4½ per cent. The improvement in the sale of gas represents, in the aggregate, an increase of revenue of 3½ per cent.

The returns for coke, tar, and sulphate all show an improvement, which, together, fully covers the increased cost of coals during the year; but the Board fear that this will not be the case when the new coal contracts at further advanced rates (which, in common with other companies, the Directors have had to accept) come into force.

New purifiers have been erected at Havre; and the new gasholder at the same station was completed in December last.

Allusion was made in the previous report to a claim formulated by the French Government for a tax on the Company's shares held in France. The matter has been fully investigated; and the amount of the claim was eventually fixed, as a compromise, at £4675, which amount the Company has been obliged to pay. The proportionate amount of the tax for the past year will be deducted from the final dividend on shares held in France, in respect of which the duty has been paid, and a similar deduction will be made in future to cover this annual tax. The profits for the year under review, which without this claim would have shown a moderate increase on the previous year, have been materially affected by the above charge. Having regard, however, to the exceptional nature of the claim, the Directors propose that £4073 19s. 1d. be taken from the reserve of undivided profits, which will allow of the payment of the usual dividend and bonus.

They accordingly recommend that a dividend be paid of 20s. per share on the fully-paid shares and 15s per share on those £7 10s. paid, less the interim dividend of 8s. and 6s. per share respectively paid on 1st of February last; also that a bonus of 1 per cent. be paid on all shares, according to the amount paid thereon—subject, however, to a deduction for French stamp and transfer duty of 1s. 1d. per fully-paid share, and 10d. per share £7 10s. paid, in respect of all shares held in France.

Notice has been given that two Directors (E. T. E. Besley, Esq., Q.C., and E. F. White, Esq.) and both Auditors (J. Reeson, Esq., and F. M. Fry, Esq.) retire from office at this meeting; but, all being eligible, they offer themselves for re-election.

The Chairman, in moving that the report of the Directors and the statement of accounts be received and adopted, said the former entered very fully into everything that had taken place during the year; and therefore he need only perhaps direct attention to the most interesting of the matters referred to in it. He thought all the shareholders present must be very satisfied with the report, which was an excellent one. He had often mentioned, and the shareholders knew well, the keen competition from electricity which the Company at all times experienced in the towns they supplied; and when they recollected this, and saw that they had had such a good year (showing an increase of 3½ per cent. in the rental), he thought they must feel it was a matter upon which they might fairly congratulate themselves. There was, of course, always some misfortune connected with these things; and the most disagreeable feature was the unfortunate claim they had had to pay to the French Government for the duty upon the shares held in France. It arose from the fact that the shares were quoted on the Nantes Bourse. This brought it to the notice of the French Government; and it was then ascertained that the duty had not been paid upon the shares held by the French shareholders. The Directors put the matter into the hands of a most able French barrister; and it appeared that the Government might, if they had so chosen, have inflicted a fine, besides the sum of money they had to pay—viz., £4675, which had been paid out of the profits of the past year. In future, the Board would obtain this duty from the French shareholders. Turning to other matters of interest, he said that the Company had now nearly 60,000 stoves out on hire, and 475 engines. Their consumers, who previously numbered 43,140, had increased to close upon 50,000. The bad debts showed a decrease of £124; and they amounted to only £547, which, on a rental of £262,992, he thought the shareholders would agree was very satisfactory indeed. The mileage of mains was now 470; and it had increased by 8 miles during the year. The profit was £78,605; and had it not been for the fiscal duty to which he had referred, they would have earned their dividend and bonus and been able to carry a small sum to the reserve of undivided profit. But inasmuch as they had to pay this duty, they had to take from their reserve of undivided profit sufficient to pay the usual dividend of 10 per cent. and 1 per cent. bonus. To this he thought the shareholders would have no objection. The Directors thought they could, under the special circumstances, take the money very justly from the undivided balance, which stood at a good sum. The investments had not changed; they were the same as last year. Regarding the concessions, they had an average length of 26 years to run. That which had probably given the Directors more concern than anything else during the year had been the coal question. Coal last year cost the Company £10,400 more than in the previous year. Of course, more coal was carbonized, and more gas sold. But they did very well out of their residuals. An extra £590 was made from tar, £2190 from sulphate of ammonia, and £9600 from coke. So that, although coal cost an additional £10,400, nearly £12,400 more was received for residuals. But he was afraid the shareholders must not look forward to such a happy state of things in the present year, because, as they were aware, the Company, with others, had been—he was going to say—very much "had" by the gentlemen in the North; and they had had to pay an increased price for coal. The Metropolitan Gas Companies had contracted at something like 16s. per ton free on board; whereas last year, the price they paid was only 8s. In their own case, they had come off pretty well. Their average, he found, was about 15s. 4½d. per ton, which was somewhat better than the London Companies. The present state of the coal market had arisen from a variety of causes—the great demand for coal on the Continent, the wonderful business done in the iron and steel trade (where a large quantity of gas coal had been turned into furnace coke), and the improvement in trade brought about by the requirements for the war had all contributed to the bringing about of this great rise in price. He was, however, afraid they could not hope to go back to 8s. per ton again; but he did hope that at this time next year, their contracts would be made on easier terms than this year. Their Company stood in a different position to the London Companies, because they were not able to raise their charges for gas. They had to make agreements for terms of years; whereas the London and other gas companies in this country could increase their prices whenever the condition of their business demanded it. But the European Company could not do so. Indeed, in one case this year (Havre), they had had to lower the price, according to their contract, for lighting the town; and it became a matter of grave consideration whether it would be wise to pay this high figure for coal, or to wait. But the Directors felt that they were under an obligation to the municipalities, and that it would be perhaps culpable on their part not to make the gas supply perfectly safe by entering into contracts sufficient to tide them over a certain time next year. The new gasholder at Havre had been finished, and it was a very great improvement and a great advantage to their principal station. He (the Chairman) had not visited the works this year; he generally went over every two years. But this year Mr. Garey and Mr. Williams had visited them, and found everything in perfect order, and everything going on in a satisfactory manner. He might say the Directors had been making efforts to renew the treaty with Amiens. The Authorities had given up lighting the town by gas, and had taken to electricity. He could not say the Directors were particularly sorry for this; as they received little profit from the public lighting there. They wished, however, to enter into a treaty with Amiens to supply the shop people and private consumers; but they found it very difficult indeed to come to an arrangement, because the Municipality did not seem inclined to take the matter in hand. He knew the Company's price there was somewhat high; but they were quite willing to come down considerably, if their concession were extended for a certain number of years. He daresay the shareholders had noticed that their shares were not so high in the market as they were some time ago; but this was no doubt accounted for by the fear of the coal trouble, and possibly by a certain amount of unrest in France. But the position of the Company could not be better. It was perfectly sound and good; and if they could manage, as time went on, to get their coal at a little easier rate, there was no reason why they should not have years of prosperity in store.

Mr. N. E. B. Garey seconded the motion, which was unanimously carried.

The Chairman next moved the declaration of the dividends and bonus mentioned in the report, subject to the deduction of the French stamp and transfer duty in respect of all shares held in France. He pointed out that the shareholders got a little extra pull in having their income-tax paid, now that it was rather more than before. When dividends were paid free of income-tax, shareholders were apt to overlook the fact that it really added considerably to their dividends.

The Directors retiring by rotation (Messrs. E. T. E. Besley, Q.C., and E. F. White) and the Auditors (Messrs. J. Reeson and F. M. Fry) were next re-elected.

On the motion of Mr. J. Coppen, seconded by Mr. W. D. Beard, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman made suitable acknowledgment; and then proposed a similar complimentary vote to the Secretary and General Manager and his staff, and to the Managers, Engineers, officials, and staff abroad. Referring to the London staff, he mentioned that two of the clerks visited the stations every month or two, and went through the books, stocks, and everything with the greatest possible care and minuteness; and therefore it was necessary for this work that they should have men of some capacity, upon whom they could rely. He also referred to the excellence of the work of the Managers abroad; one and all of whom were striving to do their best to make the Company as big a success in the future as it had been in the past.

Mr. E. F. White seconded the motion, which was cordially endorsed by the shareholders.

A brief response by Mr. Williams concluded the proceedings.

THE LIGHTING OF SYDNEY (N.S.W.).

The Progress of the Australian Gaslight Company.

The "Town and Country Journal" of Sydney (N.S.W.) recently devoted some space to the above subjects. Two of its large pages were occupied with illustrations showing the operations carried on at the works of the Australian Gas Company in Kent Street, Sydney; and these were accompanied by a letterpress description. The centre picture was a view of the interior of one of the retort-houses at night, while the charging and drawing of the retorts were in progress; and surrounding it were views of one of the large holders, with an oxide of iron purifier in the foreground, the arrangements for discharging the coal at the wharf, filling the coke-trucks in the yard, and raising them by a hydraulic lift to the level of the street. From the description accompanying the rather striking group of illustrations, we take the following particulars.

It appears that as far back as 1826 people began to talk about the lighting of Sydney; but it was not until some ten years later, when the scheme was taken up in earnest by the Rev. Ralph Mansfield, the founder of the present Company, that matters began to make any substantial progress. The then Governor of the colony was Sir George Gipps; and he rendered every possible assistance to the Company in getting their Bill through the Legislative Council. The Charter of Incorporation was obtained on Sept. 7, 1837; and since then the progress of the Company has been a record of perseverance and enterprise, often in the face of almost insurmountable difficulties. So great were these, that nearly four years elapsed before the Company were able to supply the new light in place of the dim and smoky radiance cast by oil and tallow. The choice of a site, owing to the restrictive conditions in this respect of the Company's Act, had proved a matter of no little difficulty. Eventually, however, land was purchased for the purpose in Jenkins Street on the foreshores of Darling Harbour; and there was erected the nucleus of the great works now known as "the head station." The first consignment of machinery arrived on May 13, 1839. The first night upon which Sydney shone with the new illuminant was that of Her Majesty's Birthday, May 24, 1841; and to show their loyalty, the Directors authorized the supply of gas for the night to be furnished free of charge. There was naturally much rejoicing at the welcome change, and the Press was particularly jubilant over it—Directors, shareholders, and the public being alike heartily congratulated. During the first year of the Company's existence, they manufactured 12 million cubic feet of gas; and their revenue from all sources amounted to £12,125. Their storage capacity was in these early times 90,000 cubic feet—the holders being described as "cut out of the solid rock." Now the Company's largest holder—that at Mortlake—will contain 3,750,000 cubic feet.* The number of private consumers in 1897 was 34,667; and there were nearly 10,000 public lights. The quantity of coal carbonized was 130,000 tons, and the make of gas 1,445,246,000 cubic feet, or about 11,000 cubic feet per ton. The total revenue was £330,300.

It will be interesting to trace the progress of the undertaking through the intervening years. Consequent upon an influx of population, it was found necessary in 1852 to purchase land at Woolloomooloo Bay as a

* An illustrated description of this holder, which was erected by Messrs. C. & W. Walker, has been given in the "Journal" (see Vols. LII. and LIII.)—Ed. J.G.L.

site for another tank and gasholder. Two years later, ground was secured at the Haymarket for still another out-station. In 1861, more Haymarket ground was bought, and the works at the head station were also enlarged. Even then, with all these additions, the Company's mains were severely taxed to cope with the ever-increasing demand. At the end of 1865, the manufacturing power had augmented 25 per cent., and the storage capacity was 295,000 cubic feet. Towards the end of 1869, the Company, having reclaimed the water frontage of their head station at Darling Harbour, put no less a sum than £50,000 into new works and plant, comprising the new retort-house (182 feet long, 80 feet wide, and 60 feet in height), condensers, scrubbers, retorts, purifiers, &c. Balmain at this time was a rapidly-growing suburb, and, finding it impossible to spare gas for it from the head station, the Company purchased 2½ acres for an out-station on the foreshores of White Bay. Here works were in operation until 1887, when the suburb was supplied from Mortlake. Further extensions were also made to the frontage in Jenkins Street. At Five Dock, works were entered upon to supply Ashfield and Burwood, at a cost of £23,000. These, however, were subsequently dismantled when the Mortlake station was established. At this last place no less than 80 acres were secured, and 60 set apart for manufacturing purposes; the remainder being used as a water reserve and a dam for storing fresh water, holding, when full, 7 million gallons. The whole of the work cost £150,000. Finding that even the new holder, containing 2,750,000 cubic feet, erected on the first occupation of Mortlake, did not suffice, a second —that already referred to—was erected, and also a new retort house. The holder was first used on New Year's Day, 1889; and it has been worked successfully ever since. These additions cost about £60,000. In 1890, the Company purchased the goodwill and property of the Parramatta Gas Company; and as soon as the transfer was completed, an 18-inch main was ordered from England, and connected with the Mortlake works. Then, in 1891, mains were laid to Ryde, Gladesville, and Hunter's Hill; and in 1893, gas was first supplied to the public lamps and to private consumers in these suburbs direct from Mortlake. Still, in response to the ever-increasing demand, the Company, in 1897, finding the wharfage area at the head station insufficient, purchased more land giving them an extended water frontage of 40 feet, in addition to increased storage space. The latest improvement in public lighting which the Company effected was the installation, during the same year, of the Welsbach incandescent burners in the public lamps of the city and suburbs. This conversion cost about £10,000, and was not only effected without charge to the municipal authorities, but was accompanied by a reduction in the price per lamp. This liberal and spirited undertaking fitly celebrated the Company's diamond jubilee 1837-1897. As showing what a great increase in the business has taken place during those sixty years, it may be mentioned that the Company's mains pass through 41 suburban boroughs and municipalities in addition to the city proper. The whole cover an area of nearly 100,000 acres, carrying a population of 400,000. One of the longest extensions is to Guildford—20 miles from Sydney. In all, there are nine gasholders, with a capacity of 8,635,000 cubic feet; and although it may be considered that the present storage is more than adequate for all the wants of Sydney for many years to come, experience has shown that the Company will probably have to once more falsify the often-made prediction. With regard to residuals, in 1897 there was an output of 73,756 tons of coke, 11,442,877 gallons of tar, and 1400 tons of sulphate of ammonia, for all of which a ready market was found. In order to be quite up to date, the Company have introduced the prepayment system. It was first tried in the suburb of Balmain, and was found so satisfactory that it will be adopted in course of time in most of the other suburbs, as well as in the city itself.

Coming to the financial position of the Company, the capital paid up when operations were commenced was £34,600; it now stands at £681,798, with a debenture issue in London of £300,000. These figures speak for themselves. In the Board-room of the Company hangs an interesting memento of early gas days. It is an account for a quarter's gas presented to the Treasurer of St. Philip's Church, dated Dec. 30, 1843, by the Australian Gas Company. The quantity burned was 4706 cubic feet, at 25s. per 1000; totalling £5 17s. 6d. In 1840, however, it was still dearer; the charge for a "ten-hole argand burner, from dusk till nine o'clock, six nights a week," being £1 10s.; and for ten nights, £2—early hours in those days, if measured by artificial light. A 15-hole argand burner for ten nights meant £2 10s. for the same hours. "If burned on Sunday, one-sixth was to be paid in addition to the above prices; while a modest ball jet, from dusk till eleven, seven nights a week, cost £1. The charge at per light continued for some ten years before meters came into general use. Now, through successive reductions, it has fallen from 25s. to 4s. per 1000 cubic feet; and the public lamps, which were formerly rated at £10 each per annum, are supplied at £4, the Company providing the columns. The first dividend was declared in 1841; the rate being 10 per cent. per annum. For the following eighteen months, the shareholders received no return. Since then, however, dividends have been regularly paid at rates varying from £6 18s. 11d. to 15 per cent. per annum. Once, and once only, a dividend of 20 per cent. was declared. The present rate of 15 per cent. may seem large; but the fact must be remembered that the price of £17 obtainable to-day for the £6 shares only yields the investor just over 5 per cent. Of original shareholders there is not one left.

The rest of the article deals with the manufacturing operations of the Company, and is explanatory of the illustrations. This does not call for notice. In closing the historical portion of his article, the writer acknowledges his indebtedness to the interesting volume written by the Secretary of the Company (Mr. R. J. Lukey, J.P.) to commemorate the diamond jubilee of the undertaking, a notice of which appeared in the "JOURNAL" for May 17, 1898.

"Vulcan," writing in the "Ironmonger," says: "One of the latest triumphs of chemists is the manufacture of alcohol from the smoke of blast and other coal furnaces. Coal smoke of the kind contains ethylene, from which alcohol is readily made by simple means; and it is recognized that ere long the smoke of blast furnaces, coke-ovens, and gas-works will be turned to account in this way. I see already, in my mind's eye, my Scottish readers looking wistfully at the chimney-stacks of 'St. Mungo' or 'Auld Reekie,' deploring 'the waste o' a' the guid whusky fleein' up the lum.'"

ELECTRIC LIGHTING NOTES.

At the Bradford Town Hall last Friday, Mr. G. W. Willcocks, one of the Local Government Board Inspectors, held an inquiry into the application of the Corporation to borrow £56,315 for electric lighting and power extensions. The Town Clerk (Mr. F. Stevens) appeared for the Corporation, and stated that the rateable value of the city was £1,335,515. The sum asked for, he explained, was to be expended on plant and meters, with the exception of somewhere about £15,000 which was required for mains extensions.

Colonel Coke considered an application of the Worksop District Council for power to borrow £15,579 for purposes of electric lighting. The Council do not seem to have made a careful inquiry as to the likely support the undertaking will receive; but if the report of the proceedings which we have received is to be relied upon, there is a little peculiarity about the estimates of the advising Engineer. He calculates that the expenditure during the second year's working will be £2578 13s. 4d.; and the revenue for the same year £2578 13s. 4d.! This is, if correct, a very neat balance.

Through deficient estimates, there has been a considerable excess expenditure on the electric lighting scheme which the Monmouth Corporation are carrying out; and references to the matter were made at an inquiry held by Mr. E. A. S. Fawcett, of the Local Government Board, last Thursday. The Corporation had made application for power to borrow £28,000 as a supplementary loan for the purpose of completing the undertaking. It was explained that the original estimates were £20,000; and a loan for that amount had been obtained. The Corporation had since borrowed some £9000 in addition from a local bank, and wanted to borrow £28,000 to repay the bank and complete the work. There was no direct opposition, but a good deal of dissatisfaction was expressed. The Inspector promised to obtain from Messrs. Bramwell and Harris an explanation of the large discrepancy between their original estimate for electric lighting and the actual cost.

On Monday afternoon last week, the foundation stone of some new and extensive electricity works at Black Lake, West Bromwich, was laid by the Mayor (Alderman S. Pitt), in the presence of a large company. The works, which are situated on the main road from West Bromwich to Wednesbury, are being built on the most modern principles, at an estimated cost of £30,000, and provision is being made for future extensions. The work is in the hands of Mr. R. C. Quinn (Electrical Engineer); Mr. J. Mallin having charge of the building operations. Prior to the ceremony, the Mayor entertained the members and officials of the Corporation at lunch in the Council Chamber of the Town Hall. Mr. H. T. Jefferson proposed "Success to the Corporation Electricity Works," observing that it depended greatly upon the Committee who had charge of the works whether the undertaking was a success or a failure. As a ratepayer, he was extremely glad the Corporation had kept the supply of electricity in their own hands, for it had become as much a necessity as gas and water. He felt sure that if the Corporation would sell it at a reasonable price, manufacturers would gladly use it. The Mayor, in response, said they had not entered upon the undertaking without great thought and much anxiety. They had been compelled to do so chiefly in self-defence, several private companies having endeavoured to secure powers to supply electricity. They did not hold out any large promises to the ratepayers, and they must expect little or no profit from the undertaking for the first year or two; but he believed they would make a profit afterwards. In the negotiations between themselves and the Tramway Company they had detected a most remarkable opening for the supply of electricity. No less than 300,000 units would be annually required to drive the trams in the borough; and, on the whole, he considered they would have a most favourable commencement. They intended to do all they could, not only to encourage small consumers, but to help the industries of the town. They had also obtained power to make regulations with regard to the wiring and fitting up of houses with electricity; and they were determined to do all they could to protect the inhabitants from the serious dangers of bad workmanship.

At a recent meeting of the Portsmouth Town Council, Alderman G. Ellis submitted the report of the Superintendent of the electric light works (Mr. E. Price). It showed that the year ending the 31st of March last had not been so profitable as the previous one, owing to the increased expenditure for coal. During the twelve months, the Committee had spent £5616 for coal, and sold 1,393,091 units of electricity, as against £3798 and 1,224,949 units in the preceding period. Another cause of the falling off in the net profit was that for some reason the current sold per lamp connected had decreased. This diminution of income, added to the increase in the price of coal, accounted for more than £1900. Explaining what he considered the cause of the falling off in the quantity of current sold per lamp, Mr. Price thought it was due to consumers exercising more care in switching off lamps when they were not required. During the year they had connected 7090 lamps of 16-candle power; and although this was 192 less than the number put on in the preceding twelve months, they had connected more consumers, the figures for 1898-9 being 7282 lamps and 413 consumers, and for last year 7090 lamps and 426 consumers. This Mr. Price regarded as a good sign, as he thought it due to a greater proportion of domestic lighting having been reached—a fact which was borne out by figures. During the year the capital outlay had been increased by £20,277, which meant a further contribution of £1719 from the revenue for interest and sinking fund. In moving the adoption of the report, Alderman Ellis claimed that the electric light undertaking had been a success, and that if it was worked on the basis of a private company with a capital of £160,000 (the amount of the Committee's loans) their income would allow of a dividend of 5½ per cent. being paid to the shareholders, and of £2000 being carried to the reserve fund. Discussing the increase in the price of coal, he pointed out that this could not possibly have been foreseen by the Committee. He quoted from the reports of all the large towns in which the electric light is used to show that, even in places situated near the coal-fields, the profit was smaller, or smaller in proportion, than at Portsmouth. Dealing with the cause of the falling off in the quantity of current consumed, he said the Committee suspected that some of the meters were slow. In conclusion, he expressed the hope that the price of coal would fall, and that next year the Committee would again be able to hand over a cheque to the Finance Committee.

LEICESTER CORPORATION WATER SUPPLY.

An Appreciation of the Derwent Valley Water Board—Difficulties in the Future for Leicester.

At the invitation of Alderman Wood, Chairman of the Water Committee of the Leicester Town Council, the members of the Corporation last Tuesday made their annual inspection of the water-works. The party rode first to Swithland—the site of the newest reservoir – and then to Cropstone, where luncheon was served. The journey was subsequently continued to Thornton, where a brief inspection of the sand-working operations was made; and then the party returned to Leicester.

In the speeches at the luncheon, some points of interest came out. Sir Thomas Wright, in proposing "The Derwent Valley Water Board," dwelt upon the importance of the principle which was represented by that body—namely, combination in matters of municipal enterprise. The Derwent Board was, he said, one of the latest instances of combined municipal work they had been privileged to take part in. Municipal life, while very excellent in itself, was rather apt to be narrow and selfish; and one of the great things to be done in the present day was to break down that vestry-like wall of exclusiveness which corporations had, unfortunately, from time to time set up around themselves, and to show that municipal interests might best be served by the association of communities in the carrying out of great works of a *quasi* national character. Describing tersely the extent of the work which the Board had taken in hand, Sir Thomas pointed out that they were dealing with a gathering ground of some 30,000 acres, which had a rainfall equal to 53 million gallons per day. The competitors for this water were at an early stage each desirous of securing a monopoly; but Parliament came to the rescue, and wisely apportioned the share which should go to each community. The total cost of the scheme was estimated at £6,000,000 or £7,000,000; and all he hoped was that it would not cost more. The Board were happily falsifying the expectations of those pessimists who predicted that an amalgamation of this kind would not work. It was working most harmoniously, and there was every reasonable expectation that it would continue to do so. Alderman Gainsford (of Sheffield) whose name was associated with the toast, said he felt that the Water Board was the precursor and pioneer of many amalgamated Boards of a similar character in the future. He believed the system of municipal federation, which was exemplified in that Board, had a great future before it. The difficulties which faced them at the outset of the great fight for the Derwent watershed were only overcome by accepting the common-sense principles of combination and compromise. Alderman Wood, who also replied to the toast as Vice-Chairman of the Board, expressed most emphatically the obligation he was under to Alderman Gainsford and the Corporation of Sheffield for the fairness and straightforwardness exhibited by them throughout the whole of the negotiations and controversy leading up to its formation. So far as Leicester and Sheffield were concerned, an agreement might have been arrived at at a very early stage; and if it had been left to them, some £70,000 or £80,000 might have been saved. They had, it was true, got hold of a very good thing now, and they had had to pay a very high price for it; but having got it, he believed the advantage to the various municipalities would be very great indeed. To Leicester the importance of the advantage could hardly be over-estimated. To prove this, he had only to tell them that while in a dry season the yield of their present watershed was but 4,700,000 gallons of water per day, they were now consuming something like 5,300,000 gallons.

At a subsequent stage of the proceedings, in response to the toast of "The Leicester Water Committee," Alderman Wood said the Committee were fully conscious of the responsibility which rested upon them. He warned his hearers that he had a statement of a somewhat unwelcome character to make. It would be nine years before they could get their new water supply from the Derwent Valley, and he was sorry to say that the growth of Leicester was so great that they would be compelled within another year, or perhaps earlier, to look out for a temporary source of water. He knew this would come to many as "a bolt from the blue;" but the facts could not be got over. The population of Leicester last year increased to the extent of 10,000 persons, following upon an increase of 10,000 in the previous year; and it was patent that the present water supply would not be equal to the demands of the borough until the year 1909. However disagreeable the information might be, he was bound to tell them that they could not hold out until the year 1909 if the town grew beyond its present limits; so that if they heard in the course of another year, or less, of new proposals by the Water Committee for acquiring a temporary source of supply, they must not be surprised. They must not blame the Water Committee, but the increase of population. The Committee were only trying to keep pace with the enormous growth of the town. When they did get the new source of supply from the Derwent Valley, it would serve all their wants for fifty years to come; but, as was foreshadowed at the outset, they would not be able to draw upon that supply for another nine years. Parliament, in apportioning Leicester's share of the Derwent water, made an allowance for an increase of population at the rate of 2·47 per cent.; but, as a matter of fact, the increase of the water population of Leicester—which was what they had to deal with—had been at the rate of 4·85 per cent., and when he told them this, they would appreciate the difficulties of the Water Committee.

HALIFAX CORPORATION WATER SUPPLY.

The Walshaw Dean Reservoirs.

In the "JOURNAL" for the 3rd inst., we announced that the Halifax Corporation had accepted a tender for the construction of three reservoirs at Walshaw Dean for £170,766; this being the lowest of five offers submitted. They will have a capacity of 650 million gallons; and will complete the Walshaw Dean and Widdop scheme, which was initiated in 1868. The gathering-ground is all moorland, and is said to be the purest in Yorkshire. There are no farms near, and consequently no sources of pollution; and no land will have to be purchased for the protection of streams. It is expected that the first turf will be cut in

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 209.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	1½	Alliance & Dublin	10 p. c.	18—19	+½	5 10 6	60,000	5	Feb. 23	7	Ottoman, Ltd.	5—5¼	..	6 7 3
100,000	10	,,	7½	Do.	7 p. c.	18—14	+½	5 7 2	500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
800,000	100	July 2	5	Australian	5 p. c. Deb.	101—103	..	4 17 1	851,070	10	Apl. 27	7	River Plate Ord.	10—10½	..	6 13 4
200,000	5	May 16	6	Bombay, Ltd.		6—6½	..	4 12 4	250,000	Stk.	June 28	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
40,000	5	,,	6	Do. New, £4 paid		4—4½	..	5 6 8	250,000	10	Apl. 11	8	San Paulo, Ltd.	11½—12½	..	6 8 0
880,000	Stk.	Feb. 23	11	Brentford Consolidated		250—260	..	4 12 4	135,000	Stk.	Mar. 14	10	Sheffield A.	245—247	..	4 1 0
270,000	,,	,,	9	Do. New		182—187	..	4 16 3	209,053	,,	,,	10	Do. B.	244—246	..	4 1 4
50,000	,,	,,	5	Do.	5 p. c. Pref.	140—145	..	3 9 0	447,427	,,	,,	10	Do. C.	244—246	..	4 1 4
159,375	,,	June 14	4	Do.	4 p. c. Deb.	116—120	..	3 6 8	5,600,000	Stk.	Feb. 23	5½	South Metrop., 4 p. c. Ord.	123—129	−1	4 2 7
220,000	Stk.	Mar. 14	11½	Brighton & Hove Orig.		225—235	..	4 17 10	1,520,000	,,	July 12	3	Do. 3 p. c. Deb.	95—98*	..	3 1 3
226,820	,,	,,	8½	Do. A. Ord.	Stk.	165—170	..	5 0 0	380,940	Stk.	May 16	5	Southampton Ord.	115—120	..	4 3 4
999,500	Stk.	Feb. 23	5	Bristol,	5 p. c. max.	125—130	..	3 16 11	70,825	,,	July 12	4	Do. 4 p. c. Deb.	117—122*	..	3 5 7
420,000	20	Mar. 29	10	British		39—41	..	4 17 7	120,000	Stk.	Mar. 14	6	Tottenham and Edmonton A. 5 p. c. B. 3½ p. c. 4 p. c. Deb.	103—108	−17	5 11 1
50,000	10	Feb. 23	12	Bromley, Ord.	10 p. c.	24—26	..	4 12 4	250,520	,,	,,	4½		85 - 90	−8	5 0 0
79,000	10	,,	9	Do.	7 p. c.	19—21	..	4 5 8	55,100	,,	June 14	4		111—115	..	3 9 7
500,000	10	May 16	6	Buenos Ayres (New) Ltd.		8½—9½	−½	6 9 9	182,380	10	Jan. 12	5	Tuscan, Ltd.	7—8	..	6 5 0
220,000	Stk.	June 14	4	Do.	4 p. c. Deb.	99—101	..	3 19 3	149,900	10	July 2	5	Do. 5 p. c. Deb. Red.	98 –102	..	4 18 0
150,000	20	July 12	8½	Cagliari, Ltd.		23—25*	..	6 12 0								
100,000	10	June 14	8	Cape Town & Dis., Ltd.		13½—14½	..	5 10 4								
50,000	50	May 2	6	Do.	6 p. c. 1st Mort.	55—57	..	5 5 3								
550,000	Stk.	Apl. 11	1½	Commercial Old Stock		275—285	..	4 14 9								
236,425	,,	,,	1½	Do. New	do.	205—215	..	4 17 8								
238,237	,,	June 14	4½	Do.	4½ p. c. Deb.	133—138	..	3 5 3								
800,000	Stk.	May 31	9	Continental Union, Ltd.		155—160	..	5 12 6					WATER COMPANIES.			
200,000	,,	,,	7	Do.	7 p. c. Pref.	170—175	..	4 0 0	780,404	Stk.	June 28	11	Chelsea, Ord.	293—303	..	3 12 7
51,600	Stk.	Feb. 23	11	Croydon A	10 p. c.	335—340	..	4 2 4	150,000	,,	,,	5	Do. 5 p. c. Pref.	155—160	..	3 2 6
173,400	,,	,,	11	Do. B	7 p. c.	265—270	..	4 1 5	160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	143—148	..	3 0 10
555,000	Stk.	Feb. 23	5½	Crystal Palace Ord.	5 p. c.	113—118	..	4 9 0	175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb.	145—150	..	3 0 0
60,000	,,	,,	5	Do.	5 p. c. Pref.	130—135	..	3 14 1	1,720,560	Stk.	Apl. 11	7	East London, Ord.	187—192	..	3 12 11
486,090	10	Jan. 26	11	European, Ltd.		19½—20½	..	5 7 4	654,740	,,	June 14	4½	Do. 4½ p. c. Deb.	142—147	..	3 1 3
354,060	10	,,	11	Do.	£7 10s. paid	14½—15½	..	5 6 5	390,000	,,	,,	3	Do. 3 p. c. Deb.	96—98	..	3 1 3
14,993,075	Stk.	Feb. 9	4 1/10†	Gas-light and Coke	4 p. c. Ord.	97—99	−1	4 8 10	700,000	50	June 14	7½	Grand Junction 10 p. c. max. 4 p. c. Deb.	104—107	..	3 10 1
2,600,000	,,	,,	3½		3½ p. c. max.	95—97	..	3 12 2	810,000	Stk.	Mar. 29	4		130—135	..	2 19 3
3,799,735	,,	,,	4		4 p. c. Con. Pref.	117—119	..	3 7 3	708,000	Stk.	Feb. 23	14	Kent	307—312	..	4 9 9
3,993,975	,,	June 14	3		3 p. c. Con. Deb.	95—98	..	3 1 3	160,000	,,	,,	7	Do. New, 7 p. c. max.	200—210	..	3 6 8
70,000	10	May 31	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4	1,043,800	100	June 28	10½	Lambeth, 10 p. c. max.	285—290	..	3 12 5
2,800,000	Stk.	May 16	10	Imperial Continental		197—202	−1	4 19 0	406,200	100	,,	8	Do. 7½ p. c. max.	203—208	..	3 16 11
473,600	Stk.	Feb. 9	3/10	Do. 3½ p. c. Deb. Red,		100—103	..	3 8 0	850,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	130—133	..	3 0 2
75,000	5	June 14	6	Malta & Medn., Ltd.		4½—5	..	6 0 0	500,000	100	Feb. 23	13½	New River, New Shares	420—425	−2	3 3 6
560,000	100	Apl. 2	5	Met. of Melbourne	5 p. c. Deb. 4½ p. c. Deb.	107—110	..	4 10 11	1,000,000	Stk.	Jan. 26	4	Do. 4 p. c. Deb.	130—135	..	2 19 3
250,000	100	,,	4½			106—108	..	4 3 4	902,300	Stk.	June 14	7½	South-wark and	Ord. 7½ p. c. max. 5 p. c. Pref.	195—200	..	3 15 0
541,920	20	May 31	3½	Monte Video, Ltd.		10½—11½	..	6 1 8	126,500	100	,,	7½			182—187	..	4 0 3
667,946	Stk.	Feb. 23	9½	Newc'tle & Gatesh'd Con.		215—220	..	4 4 1	489,200	Stk.	,,	5			155—160	..	3 2 6
299,855	Stk.	June 28	8½	Do.	3½ p. c. Deb.	104—107	..	3 5 5	1,019,585	,,	Apl. 11	4	Vauxhall	4 p. c. A Deb.	129—134	..	2 19 9
150,000	5	May 16	8	Oriental, Ltd.		7½—7¾	..	5 3 3	1,155,066	Stk.	June 14	10	West Middlesex		270—275	..	3 12 9
135,000	5	,,	8	Do. New,	£4 10s. pd.	6½—6¾	..	5 6 8	200,000	,,	,,	4½	Do.	4½ p. c. Deb.	145—150	..	3 0 0
15,000	5	,,	8	Do.	do. 1879, £1 pd.	1½—1¾	..	4 11 5	200,000	,,	Mar. 14	8	Do.	8 p. c. Deb.	99—101	..	2 19 5

* Ex. div. *Ex div.

† Next dividend will be at this rate.

September, and that the reservoirs will take four years to complete. The following are the constructional details respecting them: Top reservoir—Area, 21 acres; capacity, 146 million gallons; length of embankment, 230 yards; height of embankment, 76 feet; greatest depth of water, 70 feet; quantity of material to be used in the construction of the embankment, 121,000 cubic yards. Middle reservoir—Area, 46 acres; capacity, 340 million gallons; length of embankment, 320 yards; height of embankment, 74 feet; greatest depth of water, 68 feet; material to be used, 182,000 cubic yards. Third reservoir—Area, 27 acres; capacity, 164 million gallons; length of embankment, 230 yards; height of embankment, 72 feet; greatest depth of water, 66 feet; material to be used, 200,000 cubic yards. The total length of the reservoirs will be about 1½ miles, while they will be situate about 1000 feet above the sea. It is interesting to compare the capacity of the proposed reservoirs with those which the Corporation already possess. Walshaw Dean, 650 million gallons; Widdop, 640,511,000 gallons; Ogden, 221,806,000 gallons; Ely, 193,251,000 gallons; and Upper and Lower Deanhead, 122,155,000 gallons. The Walshaw Dean reservoirs will have a total drainage area of 2325 acres, and will provide an available water supply of 2½ million gallons per day, in addition to about 1½ million gallons per day as compensation water. The conduits from these reservoirs will join the Widdop system, and the water will be conveyed thereby to Halifax.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

That grand old man of the community of gas managers in Scotland—Mr. Jesse Hall, of St. Andrews—was yesterday the recipient of valuable tokens of respect and esteem from former assistants and other friends. The ceremony is referred to in another column. To be able to create and to retain the affection of colleagues and subordinates, is a power which is only possessed by those who live a useful and an unselfish life. That Mr. Hall has done so, is evidenced by yesterday's proceedings. There are few gas managers—I question if there are any—who will not unite in congratulation to Mr. Hall upon completing the long and honourable connection of half-a-century with the St. Andrews Gas Company.

At a meeting of Greenock Police Board, on Tuesday, Mr. Mitchell proposed that Mr. A. M'Kenzie, first clerk in the gas office, be appointed Clerk and Collector at a salary of £150 a year, in opposition to a recommendation of the Gas Committee that Mr. M'Kenzie be appointed Collector and Mr. M'Culloch Clerk. Mr. Mitchell held that he was merely asking the Board to continue an arrangement that had been found to work well for over sixty years. Mr. M'Culloch (Town Clerk), in reply to statements made by Mr. Mitchell, said the late Mr. Chalmers was appointed Secretary to the Gas Trust; he being Clerk only under control of the Clerk of the Police Board. The whole thing raised by Mr. Mitchell rested on a fallacy; and he asked whether there were not certain family reasons why the matter was being pushed on. Provost Black characterized the bringing forward of Mr. M'Kenzie as Clerk as an attempt to snuff out Mr. M'Culloch, and moved that, as Mr. M'Culloch was Clerk to the Board, there was no necessity to appoint Mr. M'Kenzie Clerk to the Gas Trust. Bailie Campbell seconded; and the Provost's proposition was carried by 15 votes to 2. The Board afterwards confirmed the appointment of Mr. M'Kenzie as Collector, and agreed that Mr. James Campbell should take the position at present held by Mr. M'Kenzie, at £110 a year, and that Mr. Robert Smith should be appointed, at £100 a year, to fill the position held by Mr. Campbell.

The accounts of the Paisley Gas Trust for the year ending May 28 were before the Gas Commissioners on Thursday. The gross revenue amounted to £49,943, and the gross expenditure to £45,633; leaving a balance of profit and loss of £4310. From the profit and loss account, £2358 was absorbed by interest on mortgages, &c., £1079 was carried to sinking fund, and £1888 was transferred to the electric lighting authority to meet the deficiency for the year on that account. These various sums amounted to £5326, which exceeded the balance of profit and loss for the past year by £1016. This sum was regarded as the deficiency for the year against the Gas Trust. A year ago, there was a credit balance of £6916, from which there has been voted to public parks £1000, and the deficiency referred to (£1016) deducted; leaving at credit of profit and loss account the sum of £4900. It was reported by the Finance Committee that, after considering the balance-sheet, it was agreed to recommend that the sum of £1888, shown in the profit and loss account as paid on account of the deficiency on the electric light account, be placed to a suspense account, and that one-fourth thereof only be charged coal and the probable requirements of the electric lighting department, the against last year's profits. Also, that in view of the increased cost, the price to be charged for gas supplied during the current year by ordinary meters be increased 2d., and that the price for public lamps be increased 2d. per 1000 cubic feet. This recommendation was agreed to, excepting as regards the price of gas for public lamps, which was, on the motion of Bailie Eadie, fixed at 3d., instead of 2d. as recommended. The cost of gas to consumers is now 2s. 9d. per 1000 cubic feet. Last year the price was 2s. 6d.

There comes out, in the newspapers, a letter by the relentless critic of the Corporation gas undertaking—a Mr. John M'Andrew—which contains some figures not given otherwise, but the argument running through which I do not profess to understand. I therefore give the communication in full: "Turning to our Town Chamberlain's record, I venture to say it is strictly correct, and may be thus given: Total income from all sources amounting to £138,389; the total expenditure to £138,071. This, of course, includes extension of works, £11,887; and oil plant that is practically useless and of no value as stock plant, £1800. The income taken, as shown, £138,389, and expenditure, £138,071—gives a balance at credit of £218. The official statement shows a balance at credit of £399 17s. 2d., against which there is a debit charge of £472—being one-fourth of loss by the electric branch; and leaves a balance at the debit of the gas-works of £72, pence and shillings omitted. Adopting the figures found from the Gas Manager's record, as given monthly, they stand thus: Gas made in 1899. 396,443,000 cubic feet; less for loss by leakage and condensation (40,443,000) gives 356,000,000 at 2s. 6d.

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per 1000 cubic feet, amount, £44,500; rents received, including arrears, £43,137; then excess of gas made over 1898-99, 55,000,000; loss by leakage, &c., 5,000,000, leaves 50,000,000 at 2s. 6d. per 1000 cubic feet, gives £6250, to realize which cost for coal, oil, and wages, £6675—thus showing a loss by the extension of the works of £425. Then add for interest at 3½ per cent. on £11,887, less cost of extension—amount £402—and which falls to be added for oil plant that is useless £448—making together an amount that is lost sight of as £2627. I now take the coals carbonized for 1899, 42,853 tons. Average cost 12s. 6d. per ton, £25,140; wages and salaries, £15,865—making, together, £41,005; and the contract for coal for the current year is (say) 40,000 tons, at an average of 17s. 6d. per ton, gives an amount of £31,250—a difference in excess of the previous year of £6110. This somewhat darkens the picture for any surplus for even the current year. There is another point that I take leave to refer to. I find the Convener of the Gas Committee reports gas made and accounted for 333,644,000 cubic feet, which includes 5,120,921 cubic feet for works and workshops; while leakage and condensation unaccounted for amounts to 11·75 per cent. This is clearly an error, and not in harmony with the Gas Manager's returns—showing a difference of 22,356,000 cubic feet unaccounted for; and in money value is equal to £2794 lost, and doubtless through a still defective holder." The closing sentence refers to a gasholder which was found to be leaking.

The annual meeting of the Montrose Gas Company was held on Wednesday. The report of the Manager (Mr. T. D. Hall) stated that there had been an increase of consumers during the year, to the number of thirty. There were 2950 tons of coal carbonized, being an increase of 105 tons; and the gas manufactured amounted to 31,618,000 cubic feet, an increase of 720,000 cubic feet. The average illuminating power was 24·94 candles. The report and the balance-sheet of the Treasurer were adopted, and a dividend at the rate of 50s. per share was declared.

At the recent annual meeting of the Renton Gas Company, the report and accounts for the past financial year were submitted and approved. The gas manufactured amounted to 12,647,400 cubic feet—an increase of 20 per cent. over that of last year. A dividend of 5 per cent. was declared, and a balance of £230 carried forward. The extensions undertaken during the year have been completed at a cost of £4800. The Manager (Mr. W. Whyte) was highly complimented by the Directors on the successful completion of the work, and an *honorarium* of £25 and an increase of £20 in his salary were unanimously voted him.

The following statement appears in the "Falkirk Herald" of to-day: "On Saturday last the Davis Gas-Stove Company, Limited, the address of whose registered office is 200, Camberwell Road, London, S.E., came into possession of Springfield Foundry, which they purchased some time ago from M. Cockburn and Co. The new firm had their first cast on Monday. The name of the works has been changed to that of the Diamond Foundry; the name taking its origin from the 'Diamond' gas-stove, which the firm have for a number of years produced. Mr. Harold Davis, one of the partners, a gentleman who was formerly connected with the town, and who is known to a large number of friends here, will be the General Manager; and Mr. John Prentice, formerly Works Manager at the Springfield Foundry, will continue in that capacity at the Diamond Foundry. Messrs. Davis are large and well-known makers of gas-stoves, having works at Luton, England, besides obtaining large supplies of gas-stove metal from firms in Scotland. A great deal of their work has hitherto been done at Springfield; and the intention is to devote the Diamond Foundry entirely to the making of gas-stoves, and to do in it the work hitherto done for the firm in Falkirk and other parts of Scotland, while, of course, the works at Luton will also be continued. The probability is that Messrs. Davis will soon find that the Falkirk works are small enough for their trade; and that the ground available for extension purposes will be built upon, and a largely increased number of hands will have to be employed."

At a meeting of the Glasgow Town Council on Thursday, Treasurer Murray called attention to the circumstance that the Gas Committee have already spent £670,000 of the £1,000,000 for which they hold borrowing powers; and he asked where they were to obtain all the money which would be required for the new electricity works and the new gas-works at Provan. What were they to do when the remaining £300,000 had been spent? There was no reply on behalf of the Gas Committee; but Bailie Maclay, who is Convener of the Electricity Committee, said they had always obtained the money they wanted from the Gas Committee, and he had no doubt the Committee would provide any further money that might be required.

At the last meeting of the Dumfries Gas Commissioners, Bailie Currie, the Convener of the Works Committee, moved the adoption of the accounts for the past year. He said it was thought at one time that they would require to raise the price of gas by 6d. per 1000 cubic feet; but they were in the happy position now of only requiring to make an increase of 2d., which was one of the smallest increases in Scotland. They began the year with a credit balance of £895, which came in very handy now. If they did not increase the price, the revenue from gas would be £12,331. They expected to realize £2462 from coke and £231 as the rents of cookers. This would make a revenue of £15,919. The Manager's estimate of expenditure was £13,879, to which there fell to be added £945 for interest, £1092 as the contribution to the sinking fund for the redemption of annuities, and £250 which they proposed to place to reserve fund. This made a total expenditure of £16,165, and brought out a deficiency of £246. But by raising the price of gas 2d. per 1000 cubic feet, they would increase the revenue by £584; and they would thus have a surplus of £338. The accounts were adopted; and the price of gas was raised from 3s. 4d. to 3s. 6d. per 1000 cubic feet.

In the Glasgow Town Council last Thursday, Mr. M'Cutcheon, in moving the adoption of the accounts of the Water Department, said the outstanding feature of the accounts was the elasticity of the revenue. Owing to the reduction of rates, amounting to about £17,000 per annum, the revenue, exclusive of the hydraulic power supply and river supply, showed a decrease of £5741. The hydraulic power revenue showed an increase of £1706, and the river supply an increase of £24, which reduced the decrease in the total revenue to £4010; so that, but for the reduction in rates last year, the increase in the revenue account would have been upwards of £12,000. The expenditure during the past year had been particularly heavy. The increase in interest, consequent on the South

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African war, cost an extra £4400; and then they were unfortunately defeated in the heritors' assessment case in the House of Lords. This decision carried with it nearly forty years' assessments in the different parishes, and it had cost close on £3000. Their proportion of interest and maintenance of the Municipal Buildings had also been raised from £3250 to £5000 a year. Further, there had been considerable additions to costs and wages; but against this they had to place £2500, being an increase in the amount received for material and work done. In the salaries account there had been put an additional £500; being the proportion of the Engineer's salary. Formerly there was carried £1000 of this salary to new works; but as these were now nearing completion, the Committee had reduced that sum to £500, and debited the revenue account with the rest. A considerable sum was still being added to the capital account; upwards of £63,000 having been expended during the past year. There had been paid over last year to the sinking fund account, for the redemption of debt, the sum of £59,783, making the total debt paid off to May 31 last £1,014,917. The capital account now amounted to close on £4,000,000, and it could easily be understood that a slight increase in the rate of interest materially affected the department. For example, an increase of 1 per cent. on the interest costs £1100; and last year the average rate rose from £3 1s. in May, 1899, to £3 6s. in May, 1900. Notwithstanding all drawbacks, however, the Water Trust continued to prosper, and the citizens had good reason to appreciate more and more the blessing of a beautiful supply of pure water from Loch Katrine. The accounts were approved.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 21.

Sulphate of Ammonia.—At the opening of the week, buyers seemed disposed to pause; but the demand soon became brisk, and a good business has again passed, both for prompt and forward delivery. The output being limited at this time of year, prices are naturally sensitive, and have improved further, notably in Scotland. Up to £11 5s. per ton f.o.b. Leith has been paid for prompt delivery; while for Hull and Liverpool delivery £11 to £11 2s. 6d. is now the value. In the forward position, £11 7s. 6d. f.o.b. Leith has been paid for October-March; and sellers are now asking £11 12s. 6d. London quotations for delivery to the end of the year are £11 to £11 2s. 6d., Beckton terms. The tone at the close is firm.

Nitrate of Soda.—Cargoes for autumn shipment have advanced in value; and about 8s. 6d. per cwt. is now wanted. On spot, 8s. for ordinary and 8s. 3d. for refined are to-day's prices.

LONDON, *July* 21.

Tar Products.—Benzols are quiet, and very little business is being done. There are indications, however, that the autumn may see better inquiries, particularly for 50's. At the moment, there are no pressing sellers; and there is no change in values. A slightly better tone is noticed in the creosote market; and heavy foreign shipments are relieving the unusual stocks that had accumulated in makers' hands. Naphthas are steady, with a better demand for forward delivery. Important new business in pitch is reported; and with the present high price of coal, and corresponding higher values of fuel, the position of pitch for next season's delivery seems to be assured. The use of pitch for paving has grown rapidly of late years, and at the moment is absorbing very large quantities indeed. There is no change in anthracene. Naphthalene is in good odour. Generally speaking, business in all products is quiet.

The average values obtaining during the week are: Tar, 17s. 6d. to 28s. Pitch, east coast, 37s.; west coast, 34s. Benzol, 90's, 7d. to 8d.; special qualities for gas, 9½d.; 50's, 10d. Toluol, 1s. 1d. Solvent naphtha, 1s. 1d. Crude naphtha, 3½d. Heavy naphtha, 1s. Creosote, 2½d. Heavy oils, 3d. Carbolic acid, 50's, 2s. 1½d.; 60's, 2s. 7½d. Naphthalene, drained, 40s.; pressed, 75s. Anthracene, "A," 4d.; "B," 2d. to 3d.

Sulphate of Ammonia.—A steady business is being done, and large dealers are covering sales which they undoubtedly made when sulphate was much higher. Prices are improving; and the outlook is hopeful. For prompt delivery, £11 2s. 6d., less 3½ per cent., and for forward at least 2s. 6d. more, is obtainable.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The demand for all descriptions of round coal is being well maintained—requirements, in fact, still taking away practically all that collieries are raising—and so far there is little or nothing being put down into stock, which renders the outlook for the ensuing winter anything but a satisfactory one either for coalowners or consumers. In view of this situation, and also of the present anomalous condition of prices—which in the better qualities of round coal are much lower in proportion to those ruling for the commoner descriptions, while engine fuel prices are, on the other hand, altogether in excess as compared with their value relatively to round coals—meetings of coalowners have been held during the past week to consider what action should be taken with regard to prices. Though it can scarcely be said that any definite decision has been come to that is binding upon the coalowners generally, there has been an interchange of views between the Lancashire Coal Sales Association and the one or two large collieries in West Lancashire who are outside that organization, and also with the leading Manchester colliery firms, who form an Association of their own. One or two representatives of the Coal Sales Association were strongly in favour of advancing house coal prices on Aug. 1; but as this proposal did not meet with anything like general support, and, in fact, was strongly opposed by the Manchester firms, a sort of understanding was come to that no advances should take place before Sept. 1, but that in any event there should be a general rise of not less than 1s. 8d. per ton on house-fire qualities. This movement in the better qualities of round coal will no doubt tend to harden up the current selling prices of steam

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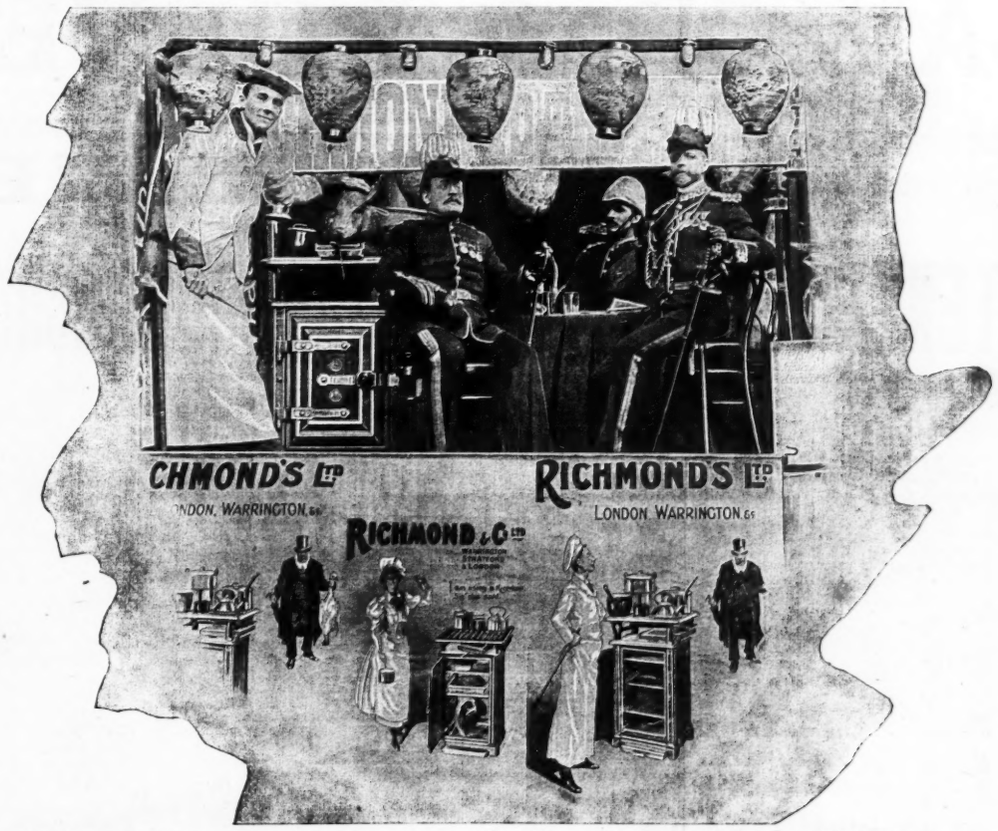
and forge qualities of fuel, which just now are being sold for immediate delivery at 6d. to 1s. below the full prices that have been obtained on contracts with the railway companies, and to a corresponding extent on the contracts for gas coals. But it is not at all likely that any further advance will be made upon the maximum rates for steam and forge and gas-making coals. Engine classes of fuel are not in the same strong position as round coals, but, notwithstanding a very keen competition by outside districts from which considerable surplus supplies have been sent in to Lancashire at 1s. below local quotations, the Lancashire collieries do not as yet consider themselves as under the necessity of reducing the relatively high price of slack. For the present, the position remains that house-fire coals are in active request; and with the certainty of a further advance in prices before the winter, no doubt the pressure from house-coal consumers will increase. For steam and forge coals, there is also a good inquiry. Engine fuel is in fair demand; and generally Lancashire collieries are moving away most of their output, though considerable business is being diverted to outside markets by the lower priced supplies from other districts. Current prices remain at 15s. to 15s. 6d. per ton at the pit for best Wigan Arley, 13s. 6d. to 14s. 6d. for Pemberton four-feet and seconds Arley, 13s. for common house coal, 12s. 3d. to 12s. 6d. for steam and forge coal, and from 10s. 6d. for common to 11s. and 11s. 6d. for best slack. The shipping trade is generally brisk, with 15s. 3d. per ton as the minimum for screened steam coal, and 15s. 6d. to 15s. 9d. obtained in many cases for good qualities delivered at the Mersey ports. Coke is in active request at the full rates of 24s. and 24s. 6d. per ton for furnace, to 31s. and 32s. for good foundry sorts at the ovens.

Northern Coal Trade.—The course of the coal trade of this district has been influenced by a serious strike at Rotterdam, which is a large customer for gas, bunker, and steam coals; and the stoppage of the sending of cargoes to that part has influenced the trade here and reduced the prices temporarily for some classes of coal. Best Northumbrian steam coals are quoted at 18s. per ton f o b.; and the collieries are fully at work. As to gas coals, the quietness is marked; for a fair amount of gas coal is usually sent at this season to Rotterdam, and for such quantities fresh markets have had to be temporarily found. For occasional amounts of gas coals, the price may be put at from 16s. to 16s. 6d. per ton f.o.b.; but it is quite possible that, when trade is fully resumed with Holland, there may be a return to slightly higher prices. Stockton is now in the market for its supply of gas coals. In the coke market, the demand is very full; and prices are firm all round. Best Durham coke for export is quoted at 35s. per ton f.o.b.; and locally the quotation is 29s. per ton free on Teesside. For gas coke, the demand is steady, and there is only a very limited supply at present; so that the prices are high, but very irregular.

Scotch Coal Trade.—Last week was the holiday one in Glasgow, in consequence of which there was an extensive suspension of business. For the same reason prices cannot be quoted. The shipments for the week were 197,582 tons—a decrease of 35,749 tons upon the preceding week, but an increase of 3861 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,690,123 tons—an increase of 1,114,281 tons upon the corresponding period of last year.

The Exmouth Water Company and the District Council.—The dispute between the Exmouth Water Company and the District Council has resulted in the Company serving a second writ upon that body. It is in respect of the Company's claim for the half year ended June; and the question in dispute is practically whether the Company have a right to demand the sum of £10 which they claim for water supplied in addition to the quantity provided for in their agreement with the Council. In a letter which was read at the last meeting of the Council, the Secretary to the Company said: "As to the charges being excessive, the Council and the Surveyor must be perfectly aware that the sum charged by the Company was far below the value of the water supplied; but the Company quite appreciate that the objection to pay was raised not for *bonâ fide* reasons, but only with the desire of prejudicing the interest of the Company when the time comes for fixing the sale price of the Company's undertaking." The writer went on to point out that the Council need not take the Company's water except for statutory purposes. If they did, the Company, as sellers, named the price, and the Council must pay. The reply of the Council is in the form of a renewal of their offer to have the question of the amount determined by two Justices, as provided by the Act of Parliament.

The "Lancet" on the Control of the Metropolitan Water Supply.—The current issue of the "Lancet" contains the report of the Special Commission appointed by the conductors of that paper to inquire into the subject of the control of the Metropolitan Water Supply. It states that control, as applied to the Metropolitan Water Companies, means that some superior authority should have statutory powers to enforce obligations which have been imposed by law on the Water Companies. Additional powers of control have been recommended by the last two Commissions; but up to the present the Government have made no attempt to translate these recommendations into statutory life. Our contemporary thinks the matters of greatest urgency in respect to the control of the London Water Companies are these: The Auditor appointed by the Local Government Board should be in all respects an officer of that Board, and his salary should be paid from public sources. He should, when he wishes it, in the case of any difference with the Companies have the advice and help of the Law Officers of the Crown. The Water Examiner appointed by the Local Government Board should have access to all parts of the Companies' undertakings; and he should be entirely responsible for the report he issues monthly. The Companies should be obliged to place at his disposal every facility for making the several investigations he wishes. Every investigation that the Examiner makes should be done either by himself or by officers appointed by him. Any analyst he may employ should be nominated by himself, and all the expenses entailed in carrying out the work necessary for him to give full and accurate information should be paid by the Government Department. The Special Commissioners think that the Government, having appointed and received the reports of two Royal Commissions, have no legitimate reason for delay in passing a simple measure which will carry out the distinct recommendation of these Commissions that the power of the Water Examiner should be increased in the direction indicated.



RICHMOND'S TRIUMPHAL CAR IN STRATFORD WAR CARNIVAL.

MEMBERS OF THE STAFF REPRESENTING,

1. MR. CHAMBERLAIN. 2. SIR REDVERS BULLER. 3. SIR GEORGE WHITE. 4. LORD ROBERTS.

Heckmondwike and Liversedge District Councils and the Gas Supply.—A special meeting of the above-named bodies is to be held this week, to discuss the advisability of jointly acquiring the Heckmondwike Gas-Works, the capital value of which, according to the last balance-sheet, is nearly £58,000. The Heckmondwike authority have also in hand an electric light scheme, which is estimated to cost £15,000.

Recent New Issues of Capital.—According to the list of new capital issues in the first half of the current year recently published in "The Times," the total amounted to £74,156,075, of which £15,000 was for the Cobham Gas Company, £6000 for the Cranbrook District Water Company, and £198,788 for the East London Water Company. The principal issues offered by tender reached the nominal amount of £7,490,875, of which £75,000 was for the Lambeth Water Company, £300,000 for the Staines Reservoirs Joint Committee, and £100,000 for the West Middlesex Water Company.

Gas and Water Main Extensions at Llandudno.—The Water and Gas Committee of the Llandudno District Council have exceeded the sum borrowed in 1895 for new water and gas mains by £1141; and the Engineer has presented a plan showing further new mains which will be probably required within the next five years, at an estimated cost of £8142. At the meeting of the Council on Tuesday, the Committee reported that they approved of the plan, and recommended that an application be made to the Local Government Board for power to borrow £9283 for extensions of gas and water mains. They further recommended that sanction be asked to borrow £13,500 for completing the second section of the scheme for the extension of the 15-inch water-main. After a prolonged discussion the report was passed.

Gas Affairs at Mansfield.—Application having been made to the Local Government Board by the Mansfield Corporation for sanction to borrow £6600 for the provision of mains and other gas-works apparatus, and £2600 for the purchase of the gas undertaking of the Mansfield Woodhouse Gas Company, Colonel Coke, M.Inst.C.E., attended at the Town Hall on Wednesday, and held a public inquiry. Mr. J. H. White (Deputy Town Clerk) was present on behalf of the Corporation; and Mr. W. F. Warner on behalf of the Mansfield Woodhouse Gas Company. Mr. White explained that the apportionment of the £6600 was as follows: £2000 as part cost of the new purifying-house, new gas-mains £3600, and new meters £1000. The purifying-house, as a matter of fact, was completed; this being rendered necessary on account of the great inadequacy of the old plant. The balance of the cost of the purifying-house would be paid out of the revenue; the actual cost being £4500. There was a debt on the old house; but this was included in the original purchase. The building was still intact, but was being used for other purposes, and the old purifiers were disposed of for £200. Coming to the application for the purchase of the Mansfield Woodhouse undertaking, Mr. White stated that the sum of £2500 was agreed upon between the Corporation and the Company; the extra £100 being for legal expenses and stamp duties. Confirmatory evidence was given. The previous afternoon, the new purifying-house, to which reference is made above, was formally inaugurated. The Contractors were Messrs. C. & W. Walker, Limited.

Suffocation by Gas.—An old lady, named Isabella Cole, 76 years of age, was found dead in bed on the morning of the 10th inst., at a house in Norwich, under circumstances which left little doubt that she had been suffocated. Her habit was to keep a small jet of gas alight till daybreak, and then put it out. When the body was found, the tap was full on, but there was no light; and the assumption was that deceased had turned the tap two ways by mistake, and had been overpowered by the escaping gas. The medical evidence was to the effect that death was due to an escape of gas; and a verdict in accordance therewith was returned.

Divination for Water.—The Wallingford Board of Guardians, having for some little time been put to considerable inconvenience and expense by the flooding of a boiler-house at the Workhouse, have had under consideration the plan of sinking a deep well, with the view of supplying the building with the water now wanted. The services of a water finder were called into requisition, and, in the presence of the Chairman and members of the Board of Guardians and others, he soon, by the aid of his forked hazel twig, came upon three springs, and the best site for a well was marked out. He estimated that water would be found at a depth of 30 to 35 feet, and that the yield would be 4000 gallons an hour.

A Water Scheme in Weardale.—According to information received by the "Newcastle Chronicle," the immense quantity of excellent water suitable for domestic purposes which has been so long wasted on the moorlands in Upper Weardale, is likely to be conserved, and practically utilized in the near future. The representatives of a local Water Company have been investigating the higher regions of the dale; and from the various sources of mountain streamlets inspected, the general opinion points to Burnhope Seat as the probable base of operations. Here, in addition to a series of fine springs, three riverlets rise beyond a plateau; and it only needs a breast wall of about 20 feet to obtain an admirable site for a reservoir which will be fed naturally.

Hoylake and West Kirby Gas and Water Company.—At the 23rd annual general meeting of this Company, to be held on the 1st prox., the Directors will report a balance of £414 at the credit of the profit and loss account, after payment of the dividends in respect of the year ending June 30, 1899. Adding the net revenues for the period ending at the corresponding date this year—£2232 for gas and £2689 for water—there is a total of £5335; but as £1805 was paid by way of interim dividend in January last, there is left a sum of £3530 available for distribution. The Directors will recommend a dividend of 9 per cent. on the original, and 4·2 per cent. on the additional gas capital, and 6 and 4·2 per cent. respectively upon the water capital. The payment of these dividends will absorb £3348, and leave £182 to be carried forward. The dividend on the "A" gas and water capital will be 13 and 10 per cent. (equivalent to 11·2 per cent. on the original shares), on the additional and new gas capital 10 per cent., and on the additional and new water capital 7 per cent. Owing to the increased cost of coal and cannel, the Directors have deemed it expedient to advance the price of gas to ordinary consumers to 3s. 9d. per 1000 cubic feet, which does not compensate for quite one-half of the additional cost of manufacture.

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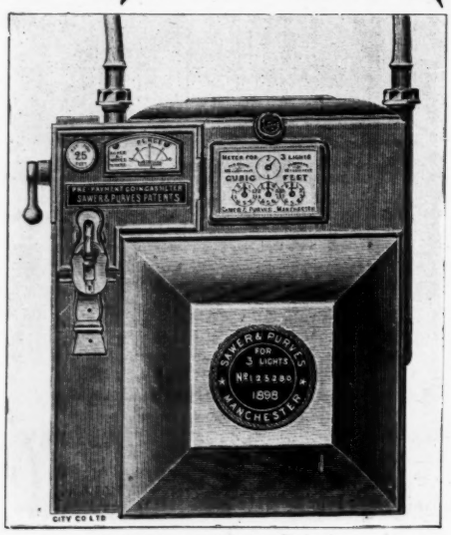
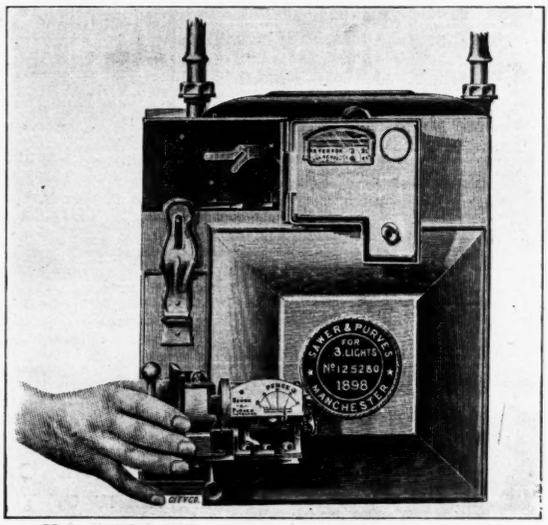


Meter in working position.



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Gas-Motors Wanted in Greece.—The "Ironmonger" says that at present Greece offers a very good market for gas-motors of all kinds. They may be imported duty free, and the gas-works at Athens and the Piræus supply gas for industrial purposes at very cheap rates. The Greek mining-works also have an increased demand for these motors. Gas stoves, too, could probably be advantageously sold in Greece. The catalogues and price-lists should be compiled in French.

Sales of Shares.—Messrs. Pendered and Son recently offered for sale some £25 "A" shares in the Wellingborough Gas Company, which realized £63 10s. each; a few £10 "C" shares fetching £20 apiece, and £100 of 4 per cent. debenture stock changing hands at £98. Last Thursday, a number of 6 per cent. preference shares, of £20 each, in the Gravesend and Milton Water Company were sold at prices ranging from £35 15s. to £37 per share. The same day, Messrs. Garrod, Turner, and Son put up to auction £2500 worth of new ordinary "C" stock of the Ipswich Gas Company. The dividend for the past five years has been 9 per cent. per annum. The stock was offered in £10 lots, and was sold at the following prices per lot: 70 at £21 10s., five at £21 12s. 6d., 37 at £21 7s. 6d., 10 at £21 6s., and 128 at £21 5s.

The Testing of Gas at Coventry.—The discrepancies between the results of tests made of Coventry gas at the works and at the Technical Institute have for some time been a cause of trouble, as our readers are aware; and it became so acute that it led to the resignation of the Chairman of the Gas Committee (Alderman Andrews). The services of Mr. J. F. Simmance, of Messrs. Alexander Wright and Co., have been called in, and he has reported on the condition of the photometer-room at the Institute. His report was presented at the meeting of the City Council last Tuesday, and was referred to a Sub-Committee, who are to confer with representatives of the Gas and Technical Instruction Committees on the matter. Alderman Andrews asked for some explanations from the Chairman of the Watch Committee (Alderman Webb Fowler), who stated that about a couple of months ago the Watch Committee received a report which showed that the illuminating power of the gas examined at the Institute differed to a considerable extent from that of the gas tested at the works. The desire of the Watch Committee had always been to maintain the amicable relations which had hitherto existed between the two Committees. They thought, therefore, that the better plan would be to ascertain why there should be so large a discrepancy. Both sets of instruments had been either made or designed by Mr. Simmance, who was consulted with the Gas Examiner and the Gas Engineer—the Town Clerk also being present. He reported that the conditions under which the gas was examined at the Technical Institute were not the same as those at the gas-works. He stated that there was more vibration in the room at the Institute, and the temperature of the two places varied to a great extent. He suggested that another room, where there would be less vibration, and where the temperature would be more even, should be chosen. He also pointed out that the service-pipe from which the gas to be tested was taken, was a long one. These matters were under the consideration of the Sub-Committee; and it was for this reason that the report was referred to them. The matter now awaits the result of their deliberations.

The Uppingham Gaslight and Coke Company, Limited, has been registered with a capital of £4000, in £10 shares, to take over the business carried on by the Uppingham Gaslight and Coke Company, constituted by Articles of Association on July 23, 1839.

Barry (Glam.) Water Supply.—The work of sinking an additional well at Biglis, in connection with the water supply of Barry, is nearing completion. The well is 40 feet to the bottom of the sump, and 11 feet in diameter. A new engine and pumping house has been erected, and the cost has been about £6000. The work is being carried out from plans prepared by, and under the superintendence of, Mr. E. W. Waite, the Water Engineer to the Barry District Council.

The Tropical Weather and the Consumption of Water in Manchester.—At the fortnightly meeting of the Water Committee of the Manchester City Council, last Thursday, Alderman Sir John J. Harwood presiding, it was reported that the stock of water at Longdendale was 3122 million gallons, which is equivalent to an estimated consumption extending over 76 days. A fortnight ago there was deemed to be a sufficient supply for 82 days; so that the position has become slightly worse. On the 19th of July last year, the storage amounted to upwards of 3800 million gallons, or 700 million gallons more than at the present time. The consumption last Wednesday was over 39 million gallons, or some 8 million gallons in excess of the daily average consumption throughout last year.

The Falmouth Corporation and the Water-Works.—Further evidence of the division of opinion among members of the Falmouth Corporation on the subject of the purchase of the water-works was afforded last Thursday. At a meeting of the Corporation on that day, the General Purposes Committee, which consists of the whole of the members of the Council, recommended that, owing to the expense of the new sewerage scheme, the question of the purchase of the water-works be deferred for the present. Mr. Williams proposed the adoption of the Committee's recommendation, and said that, now the Water Company had commenced the laying of new mains, they might hope for an improved supply. So far as the Corporation were concerned, the sewering of the town was more important than the purchase of the water-works. Mr. T. J. Thuell expressed surprise at the attempt to shelve the water purchase scheme; while Dr. Banks contended that the necessity for dealing with the sewage was not an adequate reason for postponing the other scheme. Mr. Grose moved an amendment by which the Council were invited to disapprove of the Committee's recommendation, and to proceed with the necessary measures for the purchase of the water-works under the guidance of gentlemen whom he named as Engineers, Solicitor, and Parliamentary Agents. The latter part of the amendment was ruled out of order, on the ground that the Council had left the appointment of Engineer to the General Purposes Committee. Several members protested against the Council stultifying themselves by taking the course recommended by the Committee. Mr. Grose's amendment was not seconded; but by nine votes to five the Council adopted a further amendment, instructing the Committee to select an engineer by that day week, failing which the appointment is to be made by the Council. There may now possibly be some progress made in the matter.

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New Water-Works for Rhyl.—The Rhyl Town Council have decided to promote a Bill in Parliament for the construction of a new reservoir and other works for improving the water supply of the town and district, and to amend the water rates and charges, whereby the minimum will be 10s. 10d. for cottages, with a graduated scale; the charge for property above £25 per annum rental being 8¾ per cent. This, it is calculated, will yield an annual increased rental of about £1000.

The West Surrey Water Company's Supply.—A deputation representing the Weybridge, Chertsey, and Walton District Councils recently waited upon the Directors of the West Surrey Water Company, at their London offices, to lay before them certain facts relative to the supply of these districts. In the course of the proceedings, reference was made to a report submitted by Dr. Rideal, F.I.C., in April last, in which he stated that the results of his examination showed the water to be unsuitable for drinking purposes. It was suggested that the Company should construct a large impounding reservoir. The Chairman (Mr. A. T. Simpson), in answer to the deputation reminded them that it was very difficult to attain perfection, either with water or anything else; but as far as the article supplied by the Company went, it was of fair average quality, and as good as any sent out by the London Water Companies. He could not but think that the District Councils, by the action they had taken, were raising needless fears; and it would be much better if they took steps to allay any restless feeling in the matter of the supply. He and his colleagues had listened attentively to the arguments of the members of the deputation, and they would consider them. To carry out the idea of an impounding reservoir would require money, which would take some time to obtain. After the matter had been discussed, they would communicate with the Councils. The deputation thanked the Directors, and withdrew.

New Water-Works for Earlestown and Newton.—The new water-works which, after being under consideration for something like five years, were resolved upon a few months ago by the Earlestown District Council, have been commenced, and the first of the three sections into which the entire scheme is divided is approaching completion. Two boreholes have been made, 100 feet apart, and the water will be raised by two 13-inch pumps of 4-feet stroke, actuated by a horizontal condensing engine, with helical gearing. The water will be discharged into a covered concrete tank, capable of holding 200,000 gallons, or a day's supply. From this tank it will be raised by a pair of double-acting horizontal pumps, and discharged direct into the mains. Mains 8 inches in diameter will be laid from the works to join the old mains at Newton Bridge. The two townships have for the past thirty years been indebted to the London and North-Western Railway Company for their supply of water. The relations between the District Council and the Company are of an amicable nature, and it is solely out of consideration for the ratepayers that they decided on the erection of their own water-works. The scheme is mainly due to the efforts of the Chairman of the Water Committee, Mr. C. B. F. Borron. The works have been designed by, and carried out under the supervision of, Mr. D. H. Lloyd, the Gas and Water Engineer to the Council; and the estimated cost is £23,000. The first section will cost about £6000.

Dursley Water Supply.—At the last monthly meeting of the Dursley Parochial Committee, considerable progress was made with the scheme to supply the town with water. Plans, specifications, and estimates were produced from the Engineers (Messrs. Taylor and Santo Crimp) for the carrying out of the work. Mr. Phelps, J.P., of Chistal, who is giving the necessary land and water in return for a free supply to his house, insisted that, unless a reservoir was constructed to contain 200,000 gallons, he should require an independent pipe from the tank to Chistal; so the Committee had to decide between a storage of 90,000 gallons (three days' supply), with an independent pipe for Mr. Phelps, or 200,000 gallons without the pipe. The former scheme being estimated the cheaper by £700, and strongly recommended by the Engineers, it was decided to adopt it. The motive power is to be gas.

Glyncorrwg and District Gas Supply.—The Glyncorrwg Urban District Council, who intend lighting and supplying gas to Glyncorrwg, Cymmer, and Abergwynfi, and who are now supplied by the Maesteg Gas Company, about the middle of last year invited an expert on gas and also one on electricity to report, with the object of showing which was the better system. Mr. R. A. Browning, Assoc.M.Inst.C.E, of Neath, was appointed; and the Council unanimously adopted his report, and he was instructed to prepare plans, &c., for new works complete for producing 10 million cubic feet of gas, to be erected at Cymmer. After advertising, Messrs. R. & J. Dempster, Limited, of Manchester, submitted a tender, which was accepted, it being the lowest sent in (£8880). At the meeting of the Council on the 12th inst. the Clerk reported that the Bill only awaited the Royal Assent; and he was instructed to take steps to borrow the necessary money.

The Rickmansworth Water Company and the Uxbridge Water Supply.—At the last meeting of the Middlesex County Council, the Solicitor presented a report on the Rickmansworth and Uxbridge Valley Water Company's Bill. It set forth that the Bill was considered by a Committee of the House of Commons on the 21st and 22nd of May, and was opposed by the County Councils of Middlesex and Hertfordshire. It proposed to extend the limits of the Company (who have power under their Act of 1844 to supply water in bulk) into Bucks and elsewhere. Sir Frederick Dixon-Hartland induced them to consent to the repeal of the powers referred to; but as the Company were at present supplying water in this way to the Uxbridge District Council, it was arranged that the repeal should not apply to their district. The opposition of the two County Councils resulted in clauses being inserted in the Bill to the following effect: (1) To repeal the power of supplying water in bulk, except as regards the district of the Uxbridge District Council. (2) To restrain the supply of water from the Company's wells or works to 300,000 gallons a day from the valley of the Colne or the county of Middlesex, except for use in that valley and in Middlesex, and except in case of emergency, when the Company are to deliver to the County Council of Middlesex a statement in writing of the nature of the emergency, and, when required, of the quantity taken in excess of the 300,000 gallons. (3) To keep and furnish to the County Councils of Middlesex and Herts certain records of all pumpings whenever they are in excess of 1,000,000 gallons a day.

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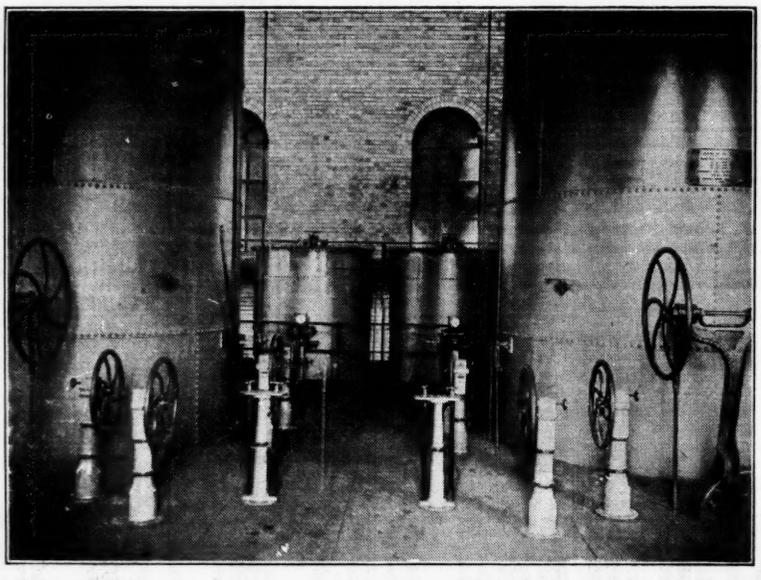

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COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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[For Illustrated Advertisement, see July 3, p. 53.]

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Gas Offices: 32, Westborough,
Scarborough, July 9, 1900.

COUNTY BOROUGH OF BURY.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase and removal of two old STEAM LANCASHIRE BOILERS each 18 feet 6 inches long by 5 feet 6 inches diameter.

They have lately been working at a pressure of 70 lbs. to the square inch, which has been certified by the Manchester Steam Users' Association, Mount Street, Manchester.

The same may be seen at the Gas-Works, Elton, Bury, upon application to Mr. H. Simmonds, Engineer and Manager.

Sealed Tenders, endorsed "Tender for Boilers," to be delivered to the undersigned on or before Monday, the 20th day of August.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bank Street,
Bury, July 21, 1900.

RAMSBOTTOM GAS COMPANY.

THE Directors of the above Company are open to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR, free on rail, in Purchaser's Tanks for One Year ending June 30, 1901.

Forms of Tender may be obtained on application to the undersigned.

Sealed Tenders to be sent to the Chairman on or before July 28, and endorsed "Tar and Liquor."

F. BARRETT,
Manager and Secretary.

Gas-Works, Ramsbottom.

CROMER GAS COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Cromer Gas Com- pany are prepared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR, free on Rail (Midland and Great Northern Railways Joint Committee), in Purchaser's Tanks, between this date and the 30th of June, 1901.

The estimated quantities for disposal are 15,000 gallons of Tar and 40,000 gallons of Liquor.

Prices to be quoted at per gallon for Tar and at per butt of 200 gallons for Liquor.

Sealed Tenders to be sent to the undersigned not later than Tuesday, Aug. 7.

By order,
P. E. HANSELL,
Secretary.

Cromer, July 21, 1900.

BOROUGH OF DERBY.

DERBY CORPORATION WATER-WORKS.
CONSTRUCTION OF FILTER-BEDS.

THE Corporation of Derby are prepared to receive TENDERS for the construction of FILTER-BEDS at their Little Eaton Low-Level Water-Works, near Derby.

Drawings may be inspected, and copies of the Specification and Form of Tender may be obtained on payment of £2 2s., to be returned if a *bonâ-fide* Tender be made, on application at the Office of the Borough Surveyor, Babington Lane, Derby; and at the Office of Messrs. T. & C. Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Tuesday, the 31st inst.

Tenders, on the prescribed form, must be delivered with the Specification (enclosed in a sealed envelope endorsed "Derby Corporation Water-Works, Contract No. 5, Tender for Filter-Beds," and addressed to the undersigned) at the Town Hall, Derby, at or before Ten o'clock in the forenoon of Monday, the 13th day of August next.

The lowest or any Tender will not necessarily be accepted.

H. F. GADSBY,
Town Clerk.

Town Hall, Derby,
July 23, 1900.

FELIXSTOWE GASLIGHT COMPANY, LIMITED.

ISSUE OF 900 FIVE PER CENT. CUMULATIVE PREFERENCE SHARES OF £5 EACH.

NOTICE is Hereby Given, that the Directors are prepared to receive TENDERS for the issue of 900 NEW FIVE PER CENT. CUMULATIVE PREFERENCE SHARES of £5 each in the Capital of the Company.

Tenders must be delivered at the Company's Office, Hamilton Road, Felixstowe, not later than Twelve o'clock noon, on Friday, the 3rd day of August, 1900.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Offices, or at the Office of the Company's Solicitors, Messrs. Jennings and Haward, Felixstowe; or of the Company's Bankers, Messrs. Bacon, Cobbold, and Co., Ipswich and Felixstowe, or at any of their other Branches; or will be forwarded on application.

By order of the Board of Directors,
W. V. WATSON,
Secretary.

Hamilton Road, Felixstowe,
July, 1900.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for the supply of 350 Tons of OXIDE OF IRON.

Forms of Tender and other Information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.

Tenders, sealed and endorsed "Tender for Oxide of Iron," to be sent to me not later than Five p.m., on Thursday, Aug. 2, 1900.

Deliveries to be made within one month of written instructions from the Gas Engineer.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
July 20, 1900.

SOUTH SHIELDS GAS COMPANY.

TO METER MANUFACTURERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of DRY GAS-METERS required during the Year ending the 30th of June, 1901.

The Meters must be of the best Quality, Stamped, and delivered at the Gas-Works, carriage paid.

The Directors do not bind themselves to accept the lowest or any Tender.

Form of Contract and further Particulars may be had on application.

Sealed Tenders, marked "Tenders for Meters," to be delivered to the undersigned not later than Friday, the 27th of July next.

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, July 16, 1900.

BLEAN RURAL DISTRICT COUNCIL.

CAST-IRON PIPES AND MAIN LAYING.

CONTRACT No. 1.

THE above Council are prepared to receive TENDERS for supplying, free of all cost, to either Sturry or Grove Ferry Stations, South Eastern Railway, as shall be directed, about 3 miles of 4-inch CAST-IRON WATER-MAIN.

CONTRACT No. 2.

The Council also invite TENDERS for LAYING the said MAIN, with all necessary MATERIAL for Jointing and Plant, the supplying of SLUICE-VALVES, AIR-VALVES, and FIRE HYDRANTS, and SPECIAL CASTINGS required in connection therewith. The whole of the goods to be supplied, and Works carried out, in accordance with the Specifications, &c., prepared by the Council's Surveyor, Mr. H. T. Sidwell, M.Inst.A.M. and C.E.

A copy of the Specifications, Form of Tender, &c., can be obtained on application to the Surveyor at his Offices, Herne Street, near Canterbury, on payment of £1 1s., which will be returned on receipt of a *bonâ-fide* Tender, and persons applying for Specifications must state whether for Contract No. 1 or No. 2 or both.

Tenders to be delivered at the Clerk's Office, 39, Castle Street, Canterbury, on or before Monday, the 7th of August next, endorsed "Water Supply Contract, No. 1 or 2," as the case may be.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
J. E. BURCH,
Clerk.

39, Castle Street, Canterbury,
July 11, 1900.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office on Friday, the 3rd day of August next, at Twelve o'clock (noon) precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending on the 30th day of June last.

Notice is Hereby also Given, that, at such Meeting, the Directors will apply to the Proprietors for AUTHORITY TO DISPOSE OF SUCH FURTHER PORTION of the Company's Property as is not now required for the purposes of their Undertaking.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 17, 1900.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Albion Tavern, Aldersgate Street, London, E.C., on Friday, the 3rd day of August, 1900, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last, to declare a Dividend for the same period, and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from the 20th day of July, until after the Meeting.

By order of the Board,
CHARLES M. OHREN,
Secretary.

Offices and Works:
Lower Sydenham, S.E.,
July 16, 1900.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

MAIDSTONE GAS COMPANY.

£5000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, the 25th of July, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND GAS COMPANY.

ISSUE OF £4500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND £600 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, the 25th of July, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

CROMER GAS COMPANY.

NEW ISSUE OF £1250 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND £2750 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, July 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

ILFORD GAS COMPANY.

£4000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, the 25th of July, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

200 £10 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, July 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

STOCK AND SHARES
IN THE
SOUTH-WEST SUBURBAN WATER COMPANY.
TOTTENHAM AND EDMONTON GAS COMPANY.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, July 25, at Two o'clock.

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Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

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WITH A PREFACE BY

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Available Output up to 5000 Tons per day.
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SILICA BLOCKS, BRICKS, AND CEMENT

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FOR GAS-FURNACES.

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Strongly recommended where EXCESSIVE HEATS have to be maintained.

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BOLDON GAS COALS.

Yield of Gas per Ton.	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

As per Analysis by
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Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

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WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·83 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE, SON, & HUNTER,

Coal Owners, Newcastle-on-Tyne;

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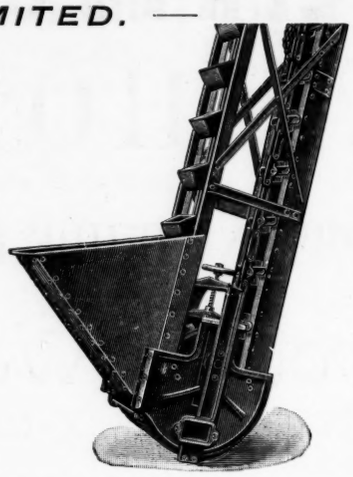

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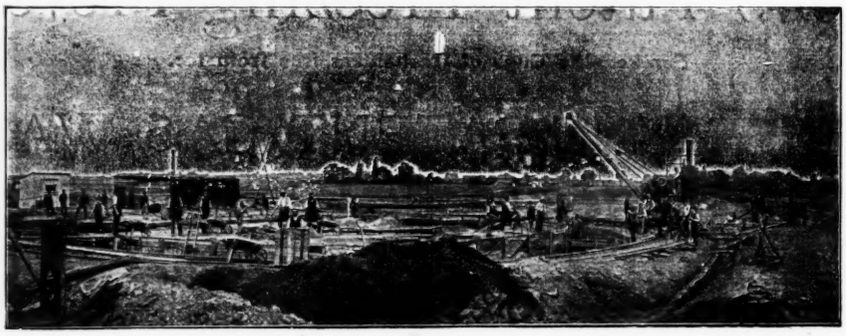

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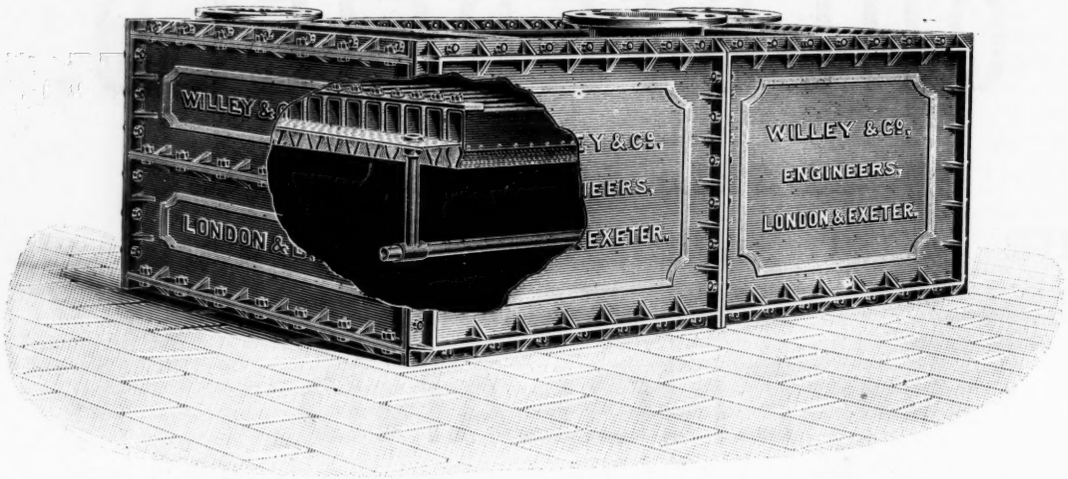

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Improved Gas Governors, Station Meters, Consumers' Meters, Gas Apparatus, and Gas-Fittings.

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Prepayment Meters for any coinage, unexcelled for Accuracy and Reliability.

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THE "RAPID" MANUAL CHARGING APPARATUS.

JUST ERECTING "RAPID" CHARGING MACHINES

At the following Places:

Four Machines at NEWPORT (Mon.)

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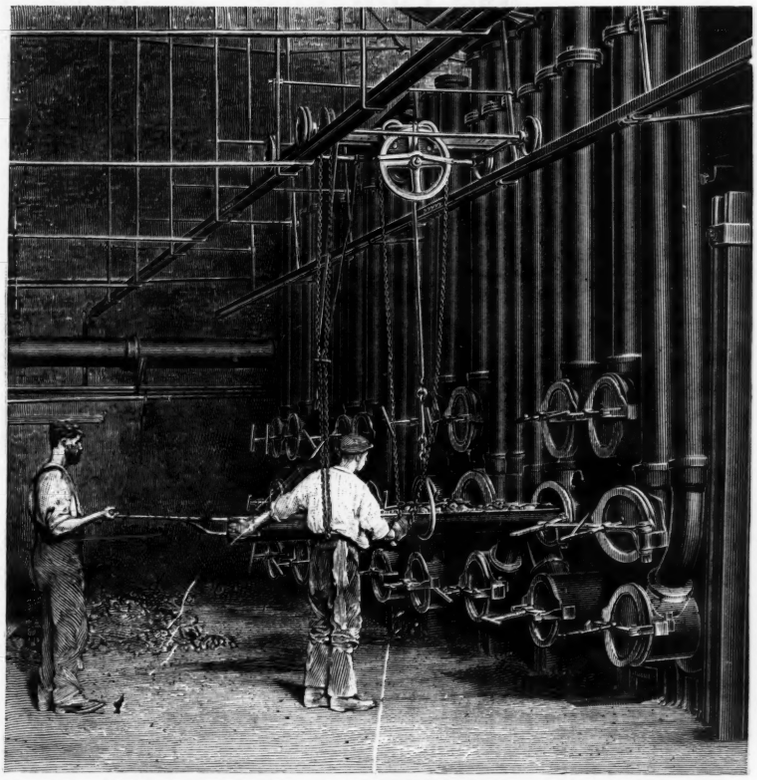
Four in the COLONIES.



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Telegraphic Address: 'Ragout, London.'

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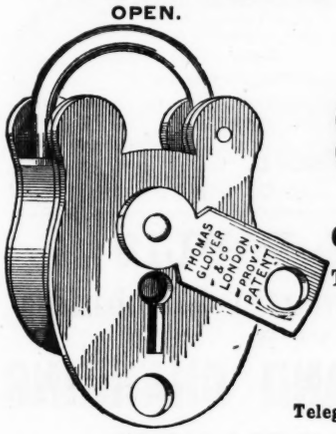

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PREVENTS TAMPERING WITH THE

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The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

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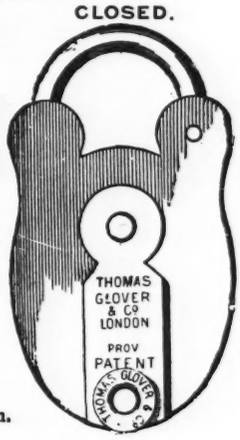

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

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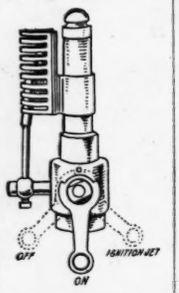

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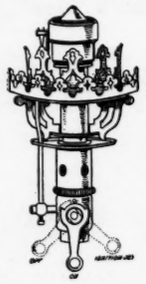

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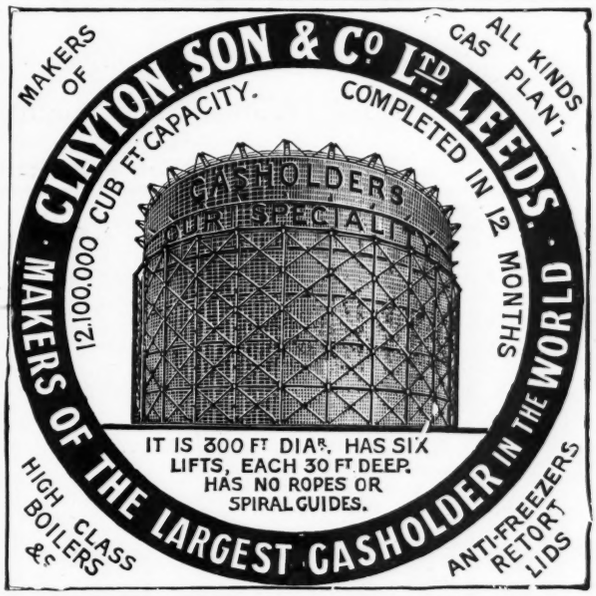
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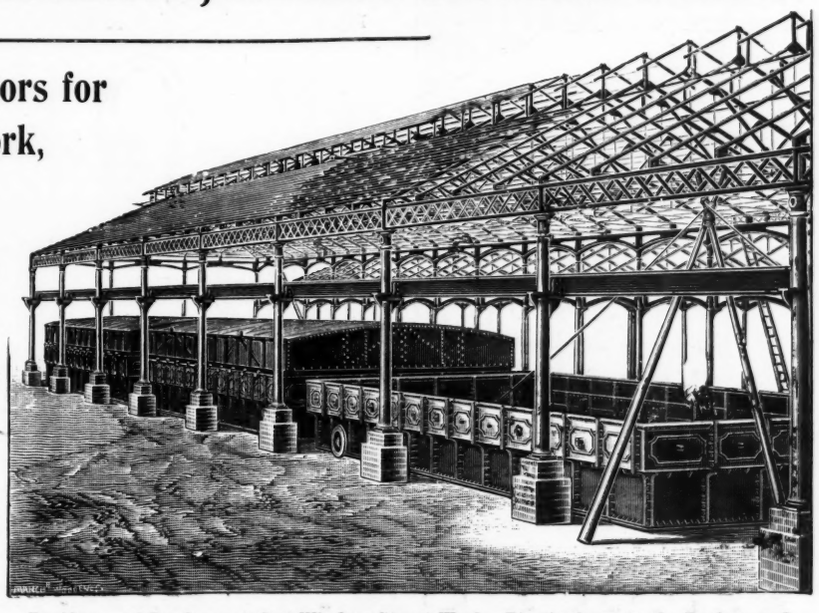

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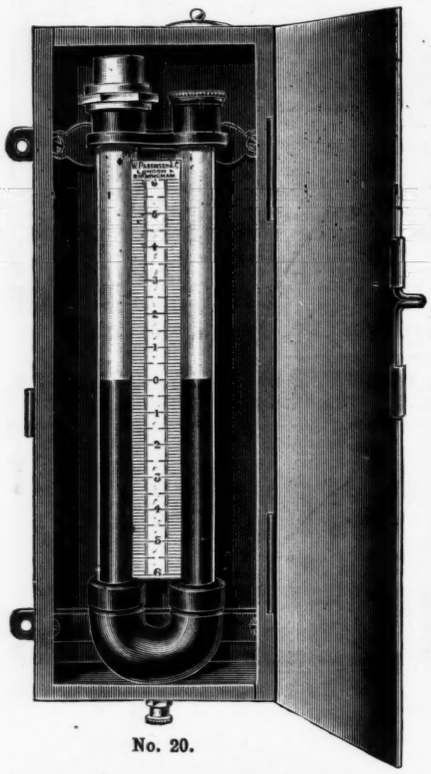


No. 20.

Fig. 2.

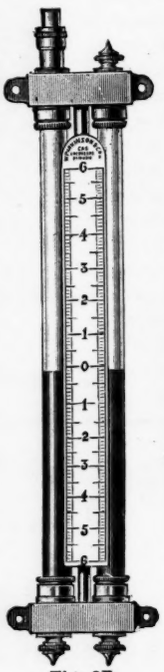


Fig. 3B.

Fig. 1.

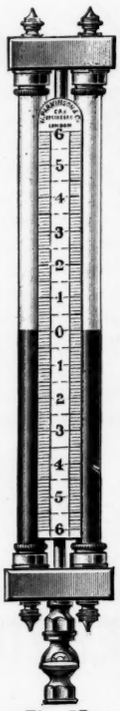


Fig. 5B.

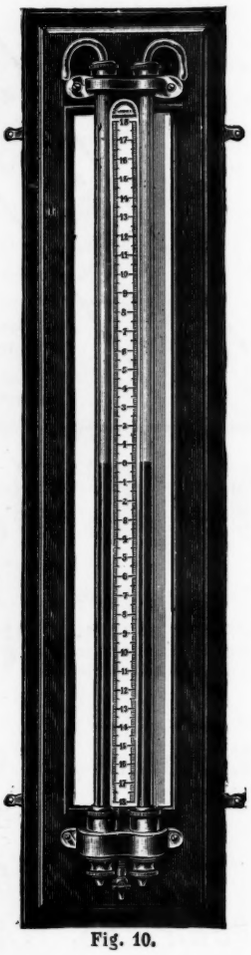
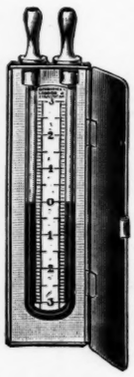


Fig. 10.



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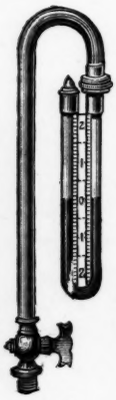
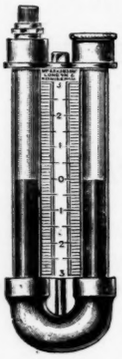


Fig. 6.



No. 28.

Fig. 9.

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[See also Advt. p. 204.

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